Service Manual

LBP2410 Series
LBP5200

Canon

Mar 10 2005

Application

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Caution

Use of this manual should be strictly supervised to avoid disclosure of confidential information.

Symbols Used

This documentation uses the following symbols to indicate special information:

Symbol	Description
	Indicates an item of a non-specific nature, possibly classified as Note, Caution, or Warning.
	Indicates an item requiring care to avoid electric shocks.
	Indicates an item requiring care to avoid combustion (fire).
	Indicates an item prohibiting disassembly to avoid electric shocks or problems.
	Indicates an item requiring disconnection of the power plug from the electric outlet.
Memo	Indicates an item intended to provide notes assisting the understanding of the topic in question.
REF.	Indicates an item of reference assisting the understanding of the topic in question.
	Provides a description of a service mode.
	Provides a description of the nature of an error indication.

The following rules apply throughout this Service Manual:

1. Each chapter contains sections explaining the purpose of specific functions and the relationship between electrical and mechanical systems with reference to the timing of operation.

Å@In the diagrams, ▬▮▮▮▬ represents the path of mechanical drive; where a signal name accompanies the symbol , the arrow ⟶ indicates the direction of the electric signal.

Å@The expression "turn on the power" means flipping on the power switch, closing the front door, and closing the delivery unit door, which results in supplying the machine with power.

2. In the digital circuits, '1'is used to indicate that the voltage level of a given signal is "High", while '0' is used to indicate "Low".(The voltage value, however, differs from circuit to circuit.) In addition, the asterisk (*) as in "DRMD*" indicates that the DRMD signal goes on when '0'.

   In practically all cases, the internal mechanisms of a microprocessor cannot be checked in the field. Therefore, the operations of the microprocessors used in the machines are not discussed: they are explained in terms of from sensors to the input of the DC controller PCB and from the output of the DC controller PCB to the loads.

The descriptions in this Service Manual are subject to change without notice for product improvement or other purposes, and major changes will be communicated in the form of Service Information bulletins.
All service persons are expected to have a good understanding of the contents of this Service Manual and all relevant Service Information bulletins and be able to identify and isolate faults in the machine."

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Chapter 1 PRODUCT DESCRIPTION

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1.1 Features

1.1.1 Feature

0007-6279

1.Compact color printer
The depth dimension of this printer is narrowed down by miniaturizing the image formation system units such as ITB unit, rotary, etc. The weight of it is reduced by adopting a molded-plastic body frame, simplifying mechanical units, and making the multi-purpose tray the only pick-up source in the printer.
2.Reduced wait time and low power consumption
This printer has realized wait time reduction and energy saving as compared to the models using the roller fixing method by adopting the on-demand fixing method.
3.DRUM CARTRIDGE
The drum cartridge, ITB unit, and ITB toner case are integrated into the drum cartridge. This allows the burdensome replacement procedure of consumable parts to be minimized for users. It resulted in the enhancement of user maintenance.
4.Employment of Canon Advanced Printing Technology
With Canon Advanced Printing Technology, data can be processed within a host computer.
This frees the printer from the PDL conversion and image processing, increasing the speed perforance and reducing the cost.
5. High-Speed Color Printing
* LBP2410
It is a high-speed color printer capable of turning out about 4 prints per min (A4/LTR) in full color or about 16 prints per min (A4/LTR) in mono color.

* LBP5200
It is a high-speed color printer capable of turning out 4 prints per min in full color or about 19 A4 prints per min or about 20 LTR prints per min in mono color.
6. Printing in Full Color on Transparencies (LBP5200)
The machine uses a rubber fixing sleeve and, thus, provides a higher toner fixing rate. The fact has increased the degree of light transmission through layers of toner, enabling full color printing on transparencies.

1.1.2 Difference in Specifications

0007-9157

In terms of specifications, the LBP2410 and LBP5200 differ as follows:

T-1-1

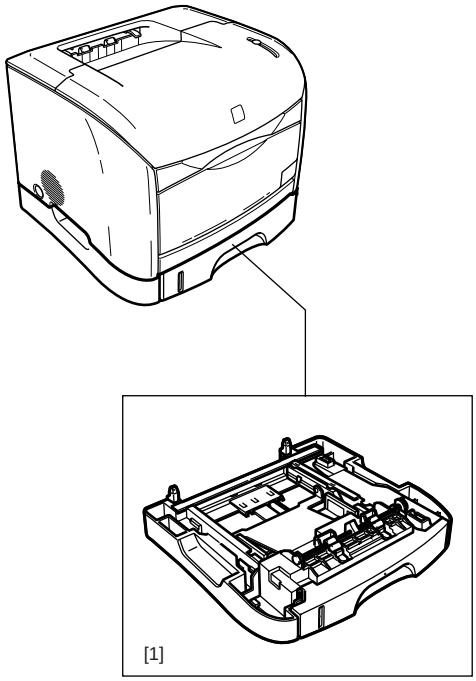
Item	LBP-2410	LBP5200
Printing speed (mono-color print)	16 prints/min (approx.; A4/LTR)	19 prints/min (approx.; A4), 20 prints/min (LTR)
Color toner cartridge yield (cartridge in shipping box)	4,000 prints (A4, single-sided; image ratio of 5%)	2,000 prints (4, single-sided; image ratio of 5%)
External cover color	Cream white	Titanium white
Fixing assembly type	Film sleeve assembly	Rubber sleeve assembly
250-sheet paper feeder	Available as option	Available as standard in Japan

1.2 System construction

1.2.1 System Configuration

0007-6282

The machine may be configured as follows with system.



F-1-1

T-1-2

[1]	250 sheets paper feeder PF-87	LBP-2410
[2]	250 sheets paper feeder PF-96	LBP5200

*The Japanese model of LBP5200 comes equipped with a PF-96 as standard.

1.3 Product Specifications

1.3.1 Product Specifications

0007-9165

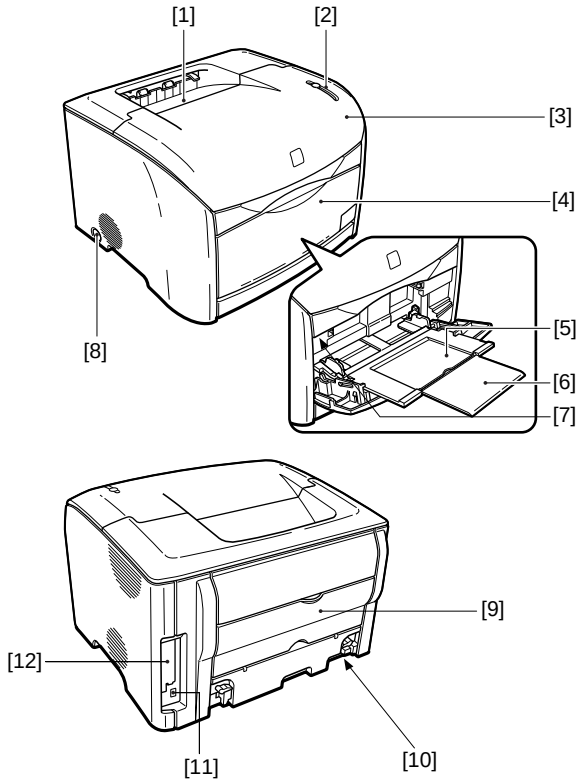
Body installation method	Desktop (paper printer)
Photosensitive medium	OPC drum
Exposure method	semiconductor laser
Development method (Mono)	contact development
Development method (Color)	contact development
Transfer method (Primary transfer)	by transfer belt
Transfer method (Secondary transfer)	transfer roller
Separation method	curvature
Cassette pickup method	by separation pad (cassettes pickup mechanism standard with Japanese model)
Multifeeder pickup method	by separation pad
Drum cleaning method	by blade
Trasnsfer cleaning method	by cleaning roller
Fixing method	on-demand fixing
Delivery method	face-down/face-up (if the paper is less than 140 mm in length, face-down delivery is not available because of the distance between delivery rollers)
Toner type	non-magnetic, 1-component dry toner
Toner supply type	by toner cartridge; about 4,000 prints (for Y, M, C; A4, single-sided; image ratio of 5%; the color toner cartridge that comes with the machine is good for about 2,000 prints); about 5,000 prints (for Bk; A4, single-sided; image ratio of 5%)
Warm-up time	120 sec or less max.
Printing resolution	600 dpi
First print time	27 sec or less (approx.; A4/LTR; full color); 16 sec or less (A4/LTR; mono color)
Print speed (A4)	4 prints/min (approx.; full color); 19 prints/min (approx.; mono color)
Print speed(LTR)	4 prints/min (approx.; full color); 20 prints/min (approx.; mono color)
Cassette paper size	A4, B5, A5, LGL, LTR, Executive (cassette pickup mechanism standard with Japanese model)
Multifeeder paper size	76.2 to 216 mm in width, 127 to 356 mm in length
Cassette paper type	plain paper (64 to 105 g/m2), recycled paper, colored paper (cassette pickup mechanism standard with Japanese model)
Multifeeder tray paper type	plain paper (64 to 105 g/m2), heavy paper (106 to 135 g/m2), recycled paper, colored paper, label sheet, transparency, envelope, postcard
Cassette capacity	about 250 sheets of plain paper (64 g/m2; cassettes pickup mechanism standard with Japanese model)
Multifeeder tray capacity	if plain paper (64 g/m2), about 125 sheets; if transparency, about 60 sheets; if envelope, about 10 sheets
Delivery tray stack	if plain paper (64 g/m2), about 125 sheets; if transparency, about 10 sheets; if envelope, about 10 sheet
Memory	8 MB (internal; expansion not possible)
Operating environment (Temperature range)	10 to 30 deg C
Operating environment (Humidity range)	10% to 80% RH
Noise	66 dB or less (during printing; as required by ISO 9296)
Power supply rating	110 to 127VAC +/-10% (50/60 +/-2 Hz), 220 to 240VAC +/-10% (50/60 +/-2 Hz)

Power consumption (Maximum)	871 W or less (approx.; including peaks exceeding 1 sec)
Dimensions	482 (W) x 451 (D) x 325 (H) mm
Weight	body: about 15 kg; drum cartridge: about 2.5 kg; toner cartridge: about 0.8 kg (per cartridge)
Option	Paper Feeder PF-96

1.4 Name of Parts

1.4.1 External View

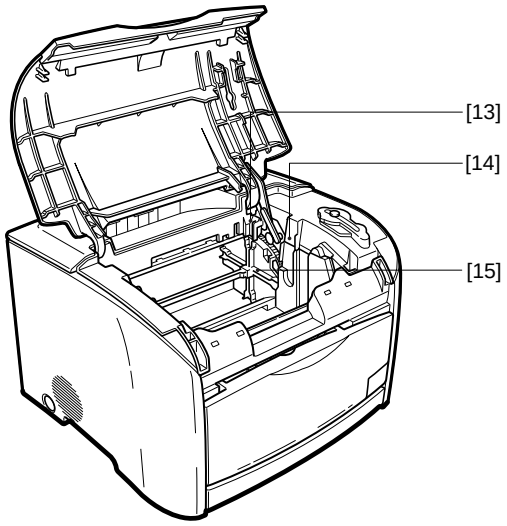
0005-8421



F-1-2

T-1-3

[1]	Facedown tray	[7]	Test print switch
[2]	Operation panel	[8]	Power switch
[3]	Top cover unit	[9]	Rear cover
[4]	Front cover unit	[10]	Power receptacle
[5]	Multi-purpose tray	[11]	USB connector
[6]	Auxiliary tray	[12]	Expansion board slot



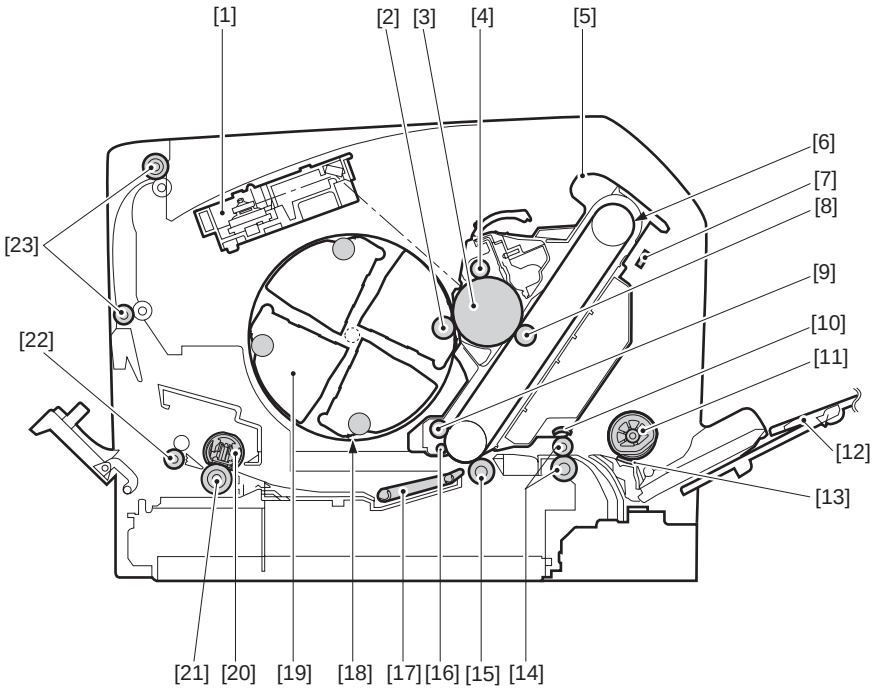
F-1-3

T-1-4

[13]	Toner cartridge slot	[15]	Developing rotary
[14]	Drum cartridge slot		

1.4.2 Cross Sectional View

0005-8557



F-1-4

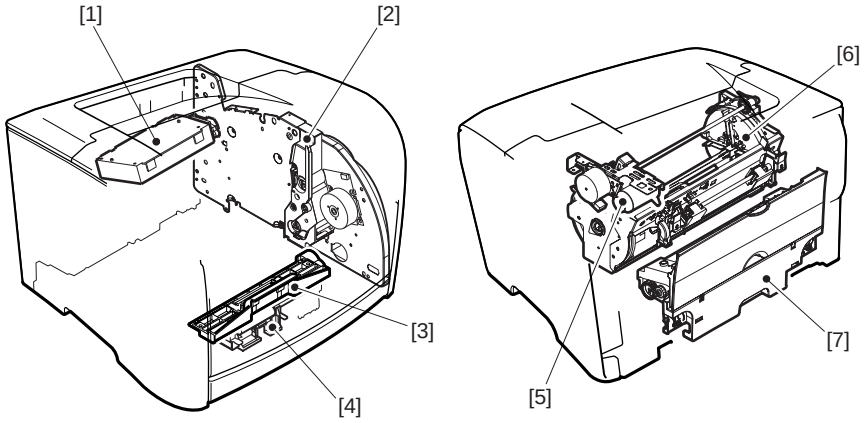
T-1-5

[1]	Laser/scanner unit	[13]	Separation pad
[2]	Developing cylinder	[14]	Registration roller unit
[3]	Photosensitive drum	[15]	Secondary transfer roller
[4]	Primary charging roller	[16]	Auxiliary ITB cleaning roller
[5]	Drum cartridge	[17]	Feed belt

[6]	ITB	[18]	Developing rotary
[7]	Density sensor	[19]	Toner cartridge
[8]	Primary transfer roller	[20]	Fixing film unit
[9]	ITB cleaning roller	[21]	Pressure roller
[10]	Registration shutter	[22]	Fixing delivery roller
[11]	Pick-up roller	[23]	Facedown delivery roller
[12]	Multi-purpose tray		

1.4.3 Main Units

0005-8752



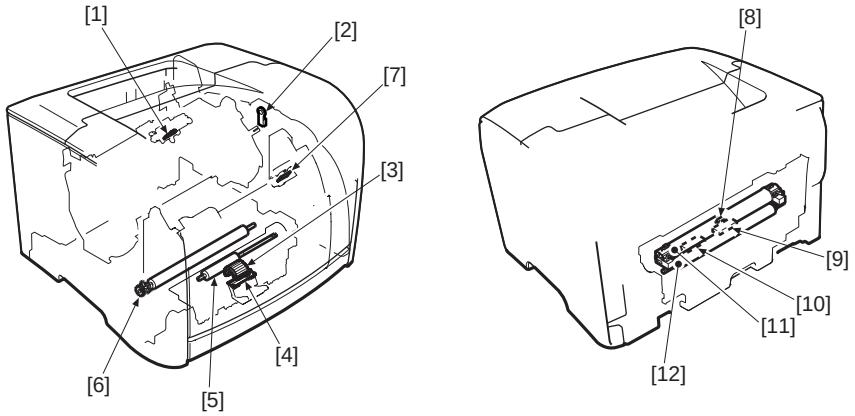
F-1-5

T-1-6

[1]	Laser/scanner unit	[5]	Rotary drive unit
[2]	Main drive unit	[6]	Developing rotary unit
[3]	Registration shutter unit	[7]	Fixing unit
[4]	Registration roller unit		

1.4.4 Main Parts

0005-8832



F-1-6

T-1-7

[1]	Toner cartridge memory tag contact	[8]	Temperature fuse
[2]	Internal temperature detection thermistor	[9]	Main thermistor
[3]	Multi-purpose tray pick-up roller	[10]	Sub thermistor
[4]	Separation pad	[11]	Fixing film unit

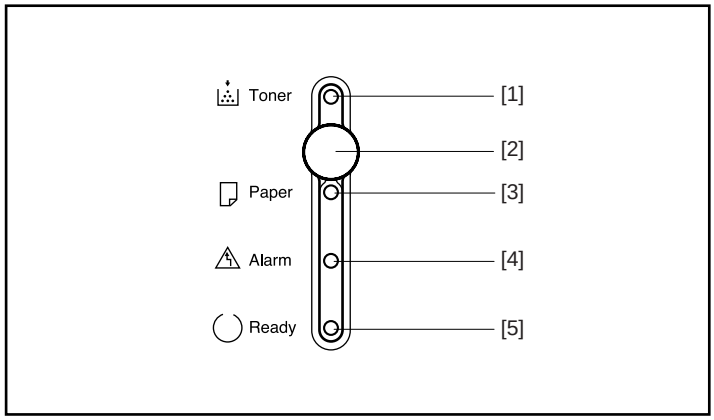
[5] Registration roller
[6] Secondary transfer roller
[7] Drum cartridge memory tag contact
[12] Pressure roller

1.5 Using the Machine

1.5.1 Control Panel

0005-8691

The machine is equipped with a control panel on its left side. Use it to check the sate of the printer or when replacing any toner cartridge.
The control panel consists of 4 LEDs and a single operation key, each with the following functions.



F-1-7

1 Toner Lamp (red)
ON: indicates that the machine is in toner replacement mode.
flashing: indicates that the toner cartridge needs to be replaced (or the toner cartridge is not correctly fitted).
2 Replace Toner Key
Hold it down for 1 sec or more before replacing any toner cartridge, thus causing the machine to enter toner replacement mode and thus enabling replacement.
3 Paper Lamp (red)
ON: indicates that there is no paper or no paper size has been selected.
4 Alarm Lamp (red)
ON: indicates that a service call condition exists.
flashing: indicates that an error other than a service call condition exists.
5 Ready Lamp (blue)
ON: indicates that the machine is ready to print.
flashing: indicates that the machine is printing or executing a job, not being able to receive print data.

1.6 Safety

1.6.1 Safety of the Laser Light

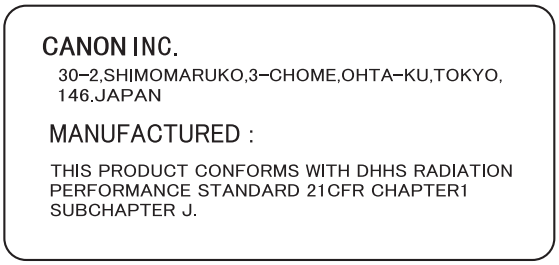
0005-8525

Laser light can prove to be hazardous to the human body. The machine's laser unit is fully enclosed in a protective housing and external covers so that its light will not escape outside as long as the machine is used normally.

1.6.2 Regulations Under the Center for Devices and Radiological Health (CDRH)

0007-6301

The CDRH of the US Food and Drug Administration put into effect regulations governing the sale of laser products in the US on August 2, 1976. These regulations apply to all laser products produced on and after August 1, 1976, and a laser product cannot be sold unless it has been certified to comply with the regulations. The following is the label used to indicate that the product has been certified under the regulations, and all laser products sold in the US must bear the label.



F-1-8

1.6.3 Safety of Toner

0005-8520

The machine's toner is a non-toxic material composed of plastic, iron, and small amounts of dye.

⚠ Do not put the toner into fire. It may explode.

Toner on the Skin or Clothes
1. If your skin or clothes came into contact with toner, use dry tissue to remove the toner, and then wash with water.
2. Do not use warm or hot water, which will cause the toner to jell, permanently fusing it with the fibers of the clothes.
3. Do not bring toner into contact with vinyl material. They are likely to react with each other.

1.6.4 Handling the Laser Unit

0005-8420

The laser/scanner unit emits invisible laser beam. DO NOT disassemble the unit as the laser beam can possibly damage your eyes. The unit cannot be adjusted in the field. The following label is attached to the cover of the unit:
*LBP-2410

DANGER-Invisible laser radiation when open.
AVOID DIRECT EXPOSURE TO BEAM.
CAUTION-INVISIBLE LASER RADIATION WHEN OPEN.
AVOID EXPOSURE TO BEAM.
ATTENTION-RAYONNEMENT LASER INVISIBLE EN CAS D'OUVERTURE.
EXPOSITION DANGEREUSE AU FAISCEAU.
VORSICHT-UNSICHTBARE LASERSTRAHLUNG. WENN ABDECKUNG GEÖFFNET.
NICHT DEM STRAHL AUSSETZEN.
ATTENZIONE-RADIAZIONE LASER INVISIBILE IN CASO DI APERTURA.
EVITARE L'ESPOSIZIONE AL FASCIO.
PRECAUCION-RADIACION LASER INVISIBLE CUANDO SE ABRE.
EVITAR EXPONERSE AL RAYO.
VARO! -AVATTAESSA OLET ALTIINA NÄKYMÄTTÖMÄLLE
LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.
VARNING!-OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD.
BETRAKTA EJ STRÅLEN.
ADVARSEL!-USYNLIG LASER STRÅLING. NÅR DENNE ER ÅBEN.
UNDGÅ BESTRÅLING.
ADVARSEL-USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES.
UNNGÅ EKSPONERING FOR STRÅLEN.
注意 -このカバーの内部では不可視レーザー光が放射されています。
レーザー光に さらされないようにしてください。

F-1-9

* LBP5200

DANGER - Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.
CAUTION - CLASS 3B. INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO THE BEAM.
ATTENTION - RAYONNEMENT LASER INVISIBLE DE CLASSE 3B. EN CAS D'OUVERTURE ÉVITEZ L'EXPOSITION AU FAISCEAU.
VORSICHT - UNSICHTBARE LASERSTRAHLUNG KLASSE 3B, WENN ABDECKUNG GEÖFFNET. NICHT DEM STRAHL AUSSETZEN.
PRECAUCIÓN - RADIACIÓN LÁSER INVISIBLE DE CLASE 3B PRESENTE AL ABRIR. EVITE LA EXPOSICIÓN AL HAZ.
VARNING - KLASS 3B OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD. STRÅLEN ÄR FARLIG.
VAROITUS - LUOKAN 3B NÄKYMÄTTÖMÄLLE LASER-SÄTEILYÄ AVATTUNA. VÄLTÄ ALTISTUMISTA SÄTEELLE.
주 의 - 열리면 등급 3B 비가시 레이저 방사선이 방출됩니다. 광선에 노출을 피하십시오.
注 意 - ここを開くとクラス3B不可視レーザ放射が出ます。ビームに身をさらさないこと。
RU5-8126

F-1-10

1.6.5 Safety of Power Supply

0005-8527

Note that even if the power switch is turned off, the current still flows to the primary side of the power supply unit.
Unplug the power cord before disassembling and reassembling the printer.

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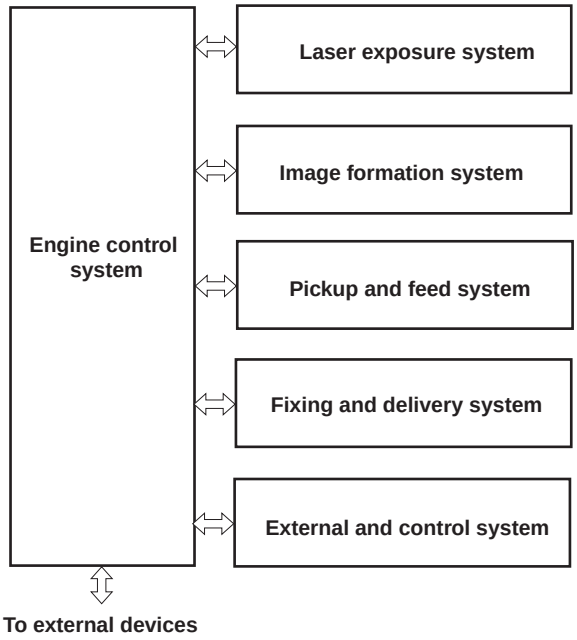
2.1 Functional Configuration

2.1.1 Outline

0005-8515

The functions of this printer can be divided into 6 blocks: the engine control system, laser exposure system, image formation system, pickup and feed system. fixing and delivery system, external and control system.



F-2-1

2.2 Basic Sequense

2.2.1 Basic Operation Sequence

0005-8519

The operation sequences for the printer are controlled by the CPU in the DC controller in the engine control system. The table below indicates the purposes and engine operations of each period from when the power is turned on until a print operation is completed and each motor stops rotating. See the appendix for the timing chart.

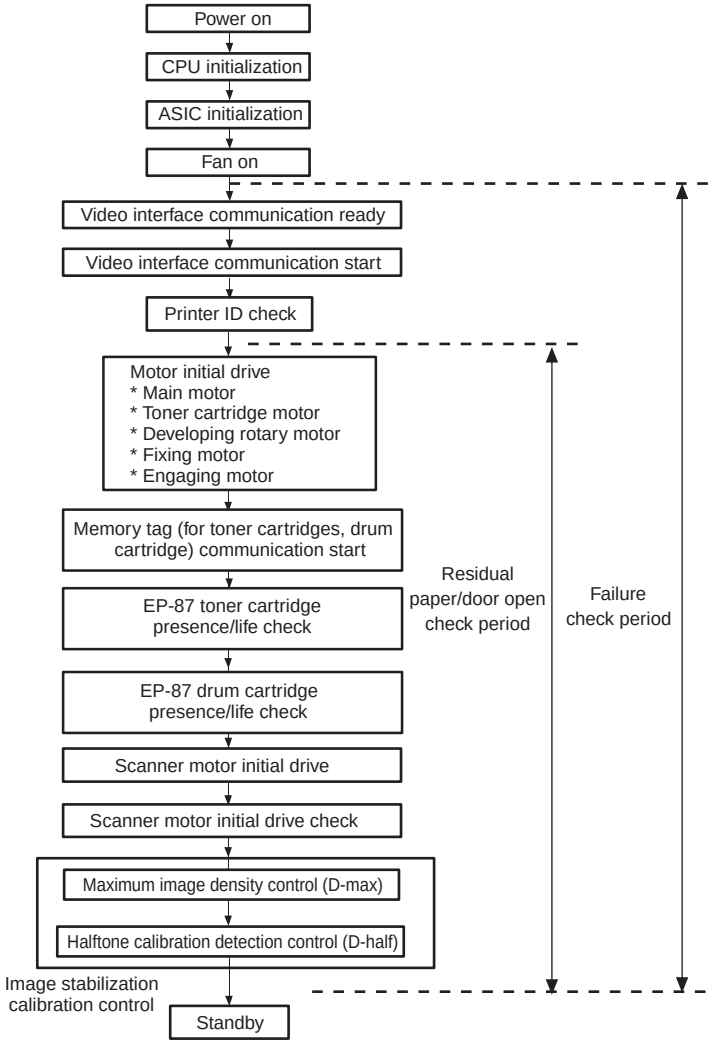
T-2-1

Period		Purpose	Remarks
WAIT (Wait)	From the power switch is turned on until ITB cleaning is completed.	To clear a potential on the drum surface and clean the ITB.	In this period, the printer executes residual paper detection, toner level detection, image density calibration control, etc.
STBY (Standby)	From the end of the WAIT or LSTR period until a print command is input from the video controller or the power switch is turned off.	To keep the printer ready to print.	
INTR (Initial rotation)	After the input of a print command from the video controller until the ITB HOME POSITION DETECTION (HP1) signal for the first color is detected.	To stabilize sensitivity of the photosensitive drum in preparation for printing.	
PRINT (Print)	From the end of the INTR period until the ITB home position for the secondary transfer is detected.	To form an image on the photosensitive drum based on the VIDEO signal input from the video controller and transfer a toner image to the ITB.	
LSTR (Last rotation)	From the end of a print operation until the main motor stops its rotation.	To transfer secondarily a toner image on the ITB to a paper and then delivers outpaper with toner fixed on.	Instant a print command is input from the interface controller; the initial rotation starts.

2.2.2 Power-on sequence

0005-8577

The power-on sequence is the first operation executed by loads based on the firmware previously stored in the printer. It is indicated in the flowchart below. The power-on sequence is executed from when the power is turned on until the printer enters the standby status.


Power on
CPU initialization
ASIC initialization
Fan on
Video interface communication ready
Video interface communication start
Printer ID check
Motor initial drive
* Main motor
* Toner cartridge motor
* Developing rotary motor
* Fixing motor
* Engaging motor
Memory tag (for toner cartridges, drum cartridge) communication start
EP-87 toner cartridge presence/life check
EP-87 drum cartridge presence/life check
Scanner motor initial drive
Scanner motor initial drive check
Maximum image density control (D-max)
Halftone calibration detection control (D-half)
Image stabilization calibration control
Standby
Residual paper/door open check period
Failure check period

F-2-2

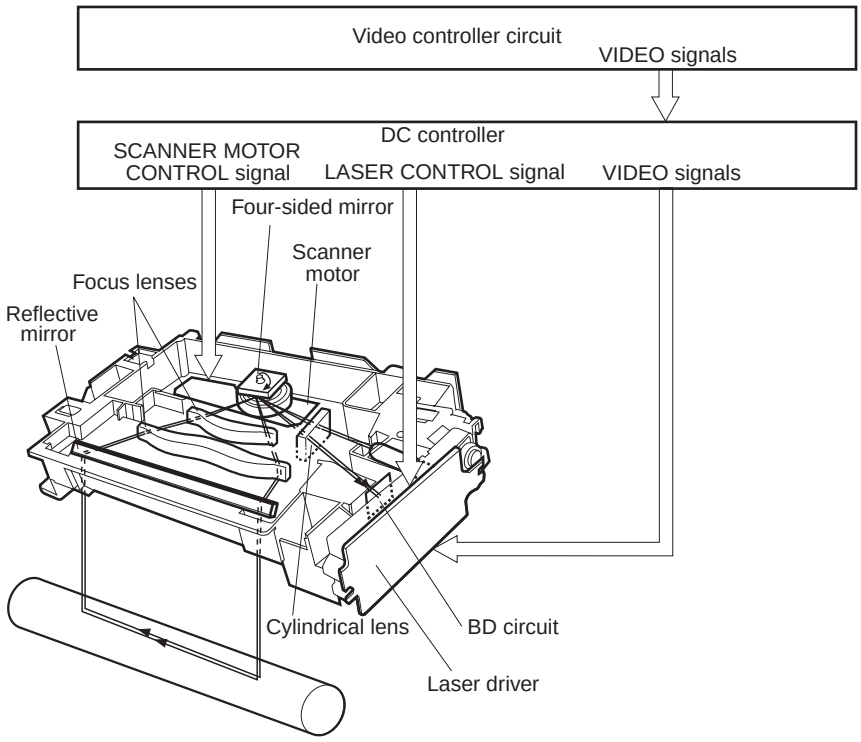
2.3 LASER EXPOSURE SYSTEM

2.3.1 Overview/Configuration

2.3.1.1 Outline

0005-8822

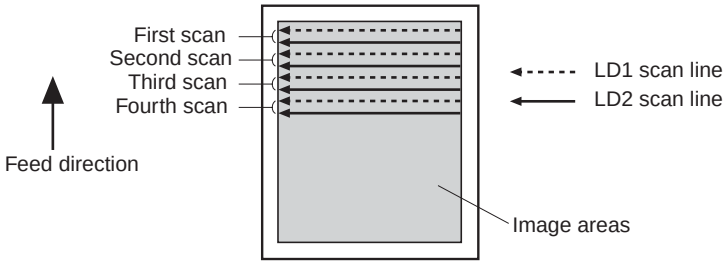
The laser/scanner system forms a latent image on the photosensitive drum according to the VIDEO signals sent from the video controller. This system consists of the laser driver circuit, scanner motor, etc. They are integrated into the laser/scanner unit and controlled by the DC controller.
The laser scanner unit is illustrated in the figure below and the sequence is described in the following.



F-2-3

The laser/scanner unit adopted a "twin beam method" (Note) which scans two lines simultaneously with two laser diodes for high-speed laser scanning with the motor revs restrained. The operation sequence of the laser/scanner unit is discussed in the following:
1) The DC controller rotates the four-sided mirror when a print command is sent from the video controller, and then rotates the scanner motor.
2) When the scanner motor starts to rotate, the DC controller emits light from the laser forcefully with the LASER CONTROL signal and then starts to control the rotation of the scanner motor.
3) The DC controller rotates the motor at a specified speed with the SCANNER MOTOR SPEED CONTROL signal.
4) The DC controller sends the VIDEO signals to the laser driver circuit after the rotational speed of the motor reaches its target value.
5) The laser driver PCB emits light from the two laser diodes according to these signals.
6) The two laser beams strike the four-sided mirror rotating at a specified speed through the collimator lens and cylindrical lens.
7) The laser beams reflected off the four-sided mirror focus on the photosensitive drum through the focus lens and reflective mirror located in front of the four-sided mirror.
8) When the four-sided mirror rotates at a constant speed, the laser beam striking the photosensitive drum scans on the drum at a constant speed.
9) When the photosensitive drum rotates and the laser beam scans on the photosensitive drum, at each specified speed, a latent image is formed on the drum.

⚠ Twin beam method
Two laser diodes (LD1, LD2) are built into the laser unit. In one scanning operation, the laser unit emits light from the LD1 and LD2 and writes two lines simultaneously. This enables a two-fold printing at the same print speed.



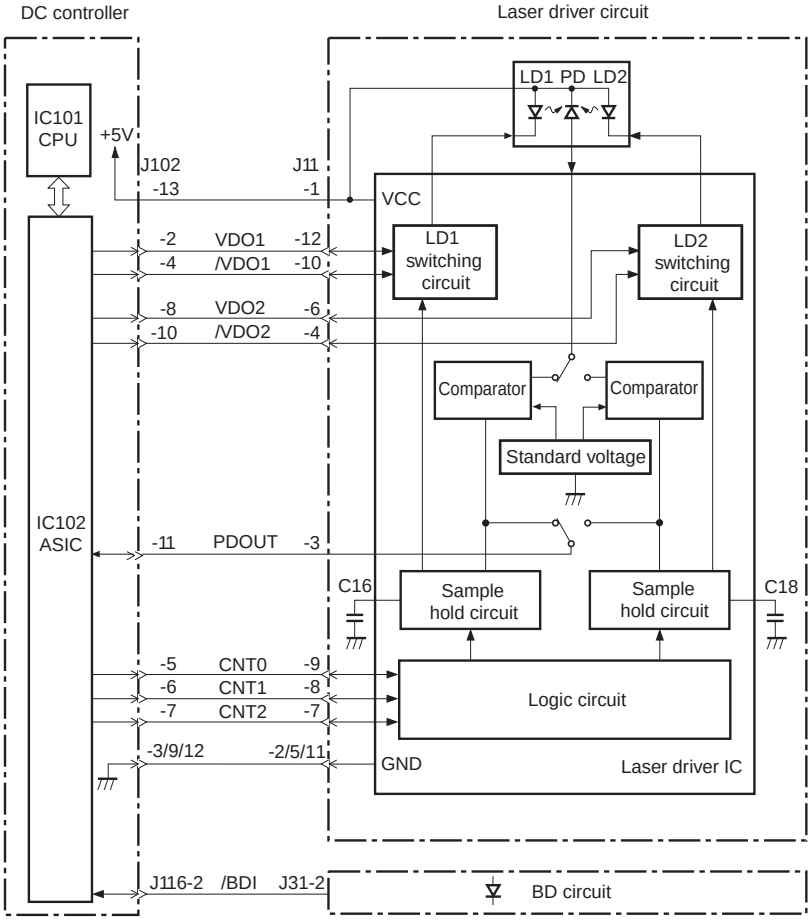
F-2-4

2.3.2 Laser Control

2.3.2.1 Outline

0005-8837

This control is utilized to turn on/off the two laser diodes (LD1, LD2) based on the LASER CONTROL signal sent from the DC controller.
The circuit diagram of the laser control is illustrated below.



F-2-5

The DC controller sends the VIDEO (VDO1, /VDO1, VDO2, /VDO2) signals for image formation and the LASER CONTROL (CNT0, CNT1, CNT2) signals for changing the operation mode of the laser, to the logic circuit in the laser driver IC. The laser driver performs the laser control responsive to a combination of the CNT0, CNT1, CNT2 signals.

T-2-2

Operation mode	CNT0	CNT1	CNT2	Details
Standby mode	L	L	L	Laser control off status
Print mode	H	H	H	Laser emission is executable according to the VIDEO signals.
LD1 force on mode	L	H	L	Turns on the LD1 forcefully
LD2 force on mode	H	L	L	Turns on LD2 forcefully
LD force off mode	H	H	L	Turns off the LD1 and LD2 forcefully

The following four controls are performed with the LASER CONTROL signals:
1) Laser emission control
2) Automatic power control (APC)
3) Horizontal synchronization control
4) Image mask control
The following describes each control performed in this control.

2.3.2.2 Laser emission control

0005-8848

In this control, the laser diodes (LD1, LD2) are turned on/off based on the VIDEO signals.
When the laser drive IC goes into print mode, the laser driver PCB turns on the laser diodes with a specified amount of light or turns it off according to the VIDEO (VDO1, /VDO1, VDO2, /VDO2) signals sent from the video controller.

2.3.2.3 Automatic power control (APC)

0005-8855

This control is utilized to maintain amount of light emitted from the laser diodes at a specified amount.
There are two kinds of the APC, initial APC (Note: 1) and between-lines APC (Note: 2). They perform in the same way. The control procedures are described below.
1) When the laser driver IC goes in to LD1 force on mode, the laser driver circuit emits light from the LD1 forcefully.
2) The light amount of the laser diode is detected by the photo diode (PD). Then it is converted to voltage level and compared with the reference voltage (voltage level equivalent to a target laser light amount) in the comparator.
3) The laser driver circuit controls the laser current until the voltage level of the LD1 laser light amount reaches the standard voltage.
4) Then, when the laser driver IC goes into LD force off mode, the LD1 is turned off forcefully. The laser driver circuit stores the adjusted laser light amount in the C16.
5) After the light amount adjustment of the LD1, the laser driver IC goes into LD2 force on mode and the laser driver circuit emits light from the LD2 forcefully. The laser light amount of the LD2 is adjusted in the same way the LD1 is done. The laser driver circuit stores the adjusted laser light amount of the LD2 in the C18.

Note 1. The APC performed at scanner motor start-up. It adjusts the laser light amount and detects a laser failure.
Note 2. The APC performed during the print period. It performs the laser light amount adjustment for one line before the first line starts to be written.

2.3.2.4 Horizontal synchronous control

0005-8860

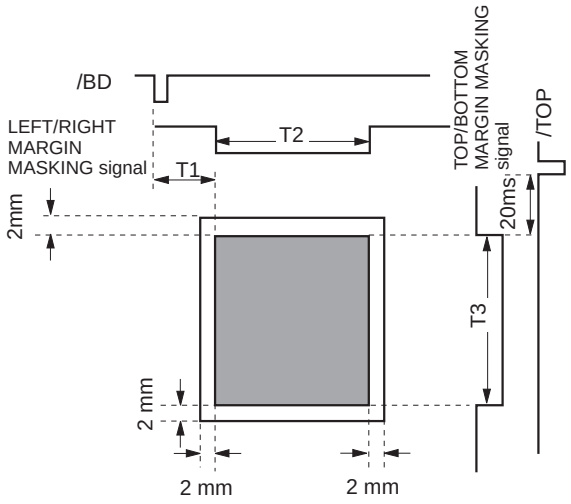
This control is utilized to determine a starting position in the image horizontal direction.
The control procedures are described below.
1) The DC controller outputs the LASER CONTROL signals in a combination of which the laser drive IC goes into LD1 force-on mode or LD2 force-on mode during the unblanking period (Note) and emits light from the laser diodes (LD1, LD2) forcefully.
2) Each laser beam is sent to the BD PCB located on the scanning path of laser beams.
3) The BD circuit detects these laser beams and generates the BD INPUT (/BDI) signal. The signal is sent to the DC controller.
4) The DC controller generates the HORIZONTAL SYNCHRONOUS (/BDO) signal based on the/BDI signal and sends the /BDO signal to the interface controller.
5) The video controller, after inputting the /BDO signal, outputs the VIDEO (VDI1, /VDI1,VDI2, /VDI2) signals to the DC controller so that the starting position in the image horizontal direction is determined.

The unblanking period is a period while light is emitted from the laser diodes in non-image areas.

2.3.2.5 Image mask control

0005-8868

This control is utilized to avoid laser beam emission on the non-image areas during periods other than the unblanking period.
The DC controller let the laser driver IC go into LD force off mode to turn off the laser diodes (LD1, LD2) forcefully while the laser beam scans on non-image areas during periods other than the unblanking period. This status is called an image mask status, which the laser diodes (LD1, LD2) do not emit light even though the VIDEO (VDI1, /VDI1, VDI2, /VDI2) signals are input during this period. Control timing for the image masking is determined based on paper size information sent from the video controller.
If the length of paper measured with the registration sensor (PS711) is longer than paper size information, the DC controller puts the image masking forcefully to avoid soiling the secondary transfer roller.



F-2-6

1. The shaded areas indicate areas in which an image can be written by the laser beams.
2. Times T1 to T3 vary according to a paper size.
3. When the multi-purpose tray is selected as a pick-up source, the paper width cannot be determined if a paper size specification command is not sent from the video controller. In this case, values of T1 to T3 are set to be that of universal size.

2.3.2.6 Laser failure detection

0005-8872

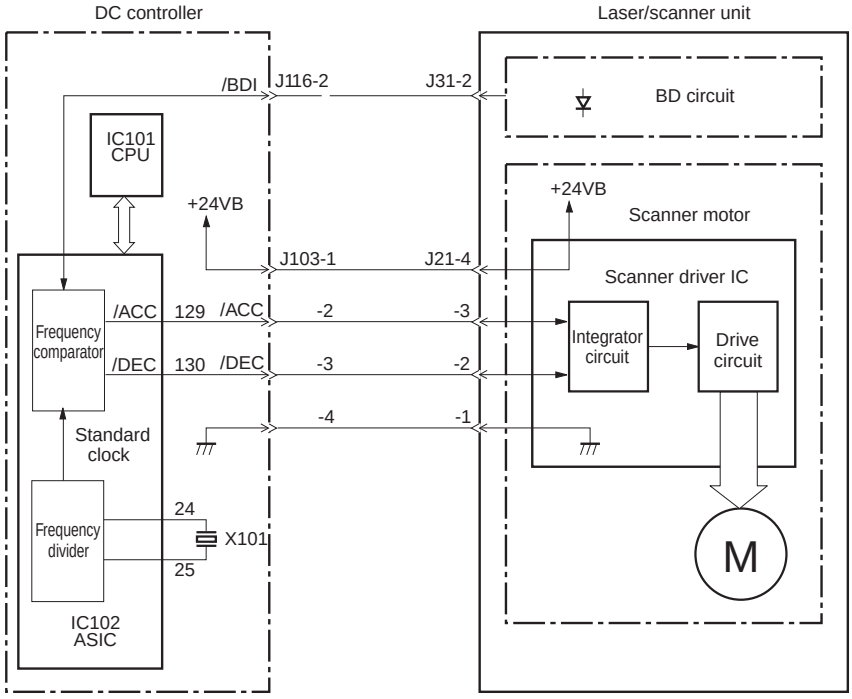
The DC controller detects a condition of the control in order for the laser control to be performed properly.
If the laser current monitor signal (PDOUT) cannot be detected when the scanner motor is started up or when APC is under way, the DC controller will assume the condition to indicate a fault in the scanner block and stop the printer; at the same time, it will communicate the fact to the video controller.

2.3.3 Laser Scanner Motor Control

2.3.3.1 Outline

0005-8877

The control is utilized to rotate the scanner motor in order to strike laser beams to a proper position on the photosensitive drum.
The circuit diagram of the scanner motor control is illustrated below.



F-2-7

2.3.3.2 Scanner motor speed control

0005-8880

This control is utilized to rotate the scanner motor at a constant speed by the DC controller controlling the scanner motor drive IC.
The scanner motor, which is integral with the scanner motor drive circuit, is a 3-phase, 12- pole DC brushless motor with a built-in Hall device.
The operations of the scanner motor control are described in the following.
After receiving a print command, the CPU in the DC controller sets the SCANNER MOTOR ACCELERATION (/ACC) signal "L" through the ASIC and then the scanner motor starts to rotate.
The /BDI signal is sent from the BD circuit as the CPU emits light from the laser forcefully during scanner motor rotation. The ASIC compares a period of the /BDI signal with the reference clock in the frequency comparator. Then it controls the scanner motor revs by controlling the /ACC signal and /DEC signal until the revs reach a specified value.

2.3.3.3 Scanner motor failure detection

0005-8882

The DC controller determines whether the scanner motor rotates at specified revs by monitoring the /BDI signal sent from the BD circuit.
The DC controller determines a optical unit failure or BD error, stops the printer engine, and notifies the failure to the video controller, under the following conditions:
1) Optical unit failure
If the detected period of the /BDI signal does not satisfy a specified range within 20 seconds at scanner motor start-up, or if the /BDI signal cannot be detected for 0.5 second after the detected period of the signal has satisfied a specified range, the DC controller determines a optical unit failure.
2) BD error
If the input period of the /BDI signal is not within the range of +/-1.7% of the scanner motors specified revs during a print operation after the motor has reached its specified revs, the DC controller determines a BD error.

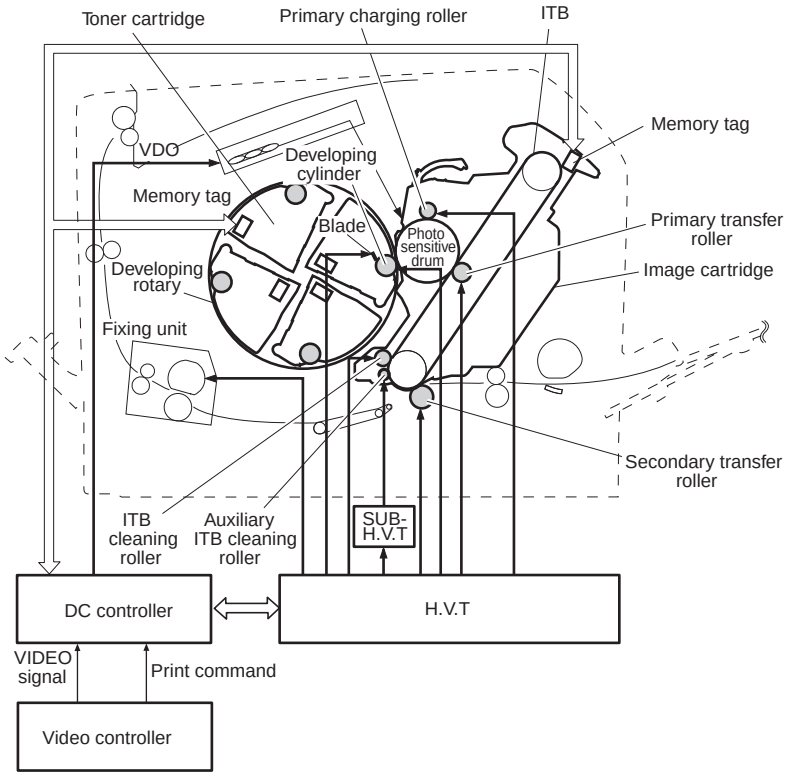
2.4 IMAGE FORMATION SYSTEM

2.4.1 Overview/Configuration

2.4.1.1 Outline

0005-8884

The image formation system, which serves as the nerve center of the printer, forms a toner image on paper.
It consists of a developing cylinder, four toner cartridges containing toner, a drum cartridge containing the ITB, photosensitive drum, etc., a developing rotary storing the toner cartridges, and a fixing unit, etc. These parts are controlled by the DC controller.
After receiving a print command from the video controller, the DC controller controls the developing rotary, laser/scanner unit, high-voltage power supply circuit to form an image based on the VIDEO signals on paper.
The toner cartridges and drum cartridge come with built-in memory tags that store cartridge usage condition information, etc. The DC controller performs reading and writing.

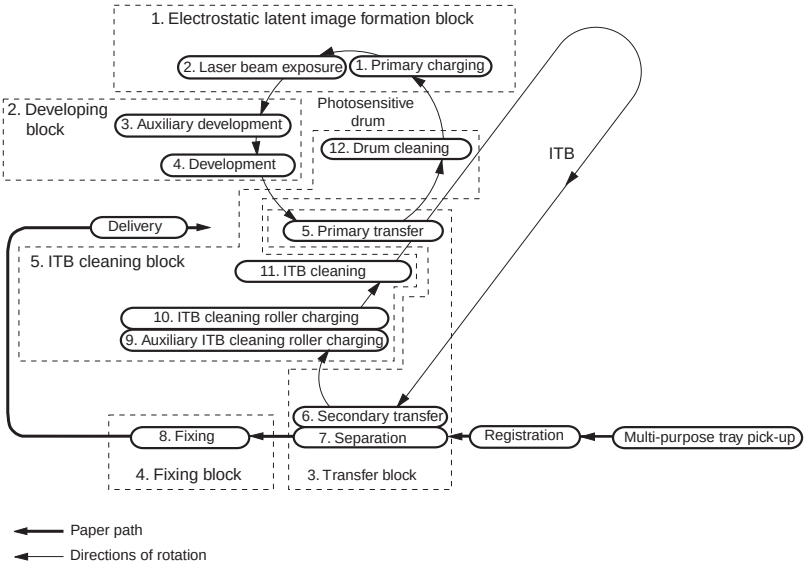


F-2-8

2.4.1.2 Image Formation Process

0005-8886

An image formation process is the basic procedures of operations for image formation.
The process can be divided into 5 blocks and 12 steps. By performing steps in each block, a toner image is formed on paper.
The following are the blocks and steps of the image formation process.



F-2-9

1) Electrostatic latent image formation block
Forms an electrostatic latent image on the photosensitive drum.
Step 1: Primary charging - A uniform negative charge is applied onto the surface of the drum.
Step 2: Laser beam exposure - An electrostatic latent image is formed on the drum.

2) Developing block
Turns an electrostatic latent image on the drum to a visible image by applying the toner onto it.
Step 3: Auxiliary development
Step 4: Development

3) Transfer block
Transfers a toner image on the drum on paper.
Step 5: Primary transfer - Toner on the drum is transferred to the ITB.
Step 6: Secondary transfer - Toner on the ITB is transferred to paper.
Step 7: Separation - Paper separates from the ITB.

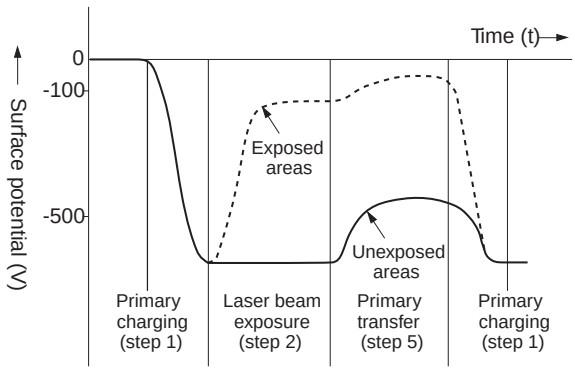
4) Fixing block
Fuses a toner image onto paper.
Step 8: Fixing

5) ITB cleaning block
Cleans residual toner on the photosensitive drum and ITB.
Step 9: Auxiliary ITB cleaning roller charging - Residual toner on the ITB is charged in order to be held on the ITB.
Step 10: ITB cleaning roller charging - Residual toner on the ITB is charged.
Step 11: ITB cleaning - Residual toner on the ITB is transferred onto the drum.
Step 12: Drum cleaning - Residual toner adhered to the drum is cleaned.

2.4.1.3 Electrostatic latent image formation block

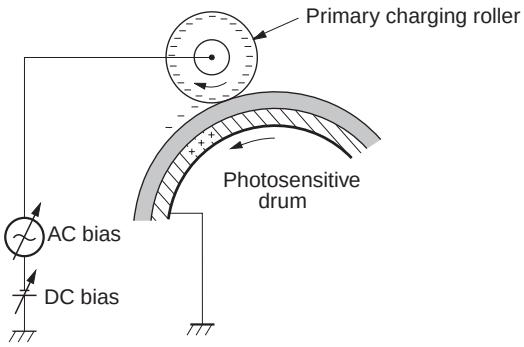
0005-8935

This block comprises three steps, which forms an electrostatic latent image on the photosensitive drum.
After the completion of the last step in this block, negative charges remain in areas on the drum surface exposed to laser beams. Negative charges are removed from areas exposed to the laser beams.
An image with negative charges on the drum is called an "electrostatic latent image" since it is invisible to the eye.



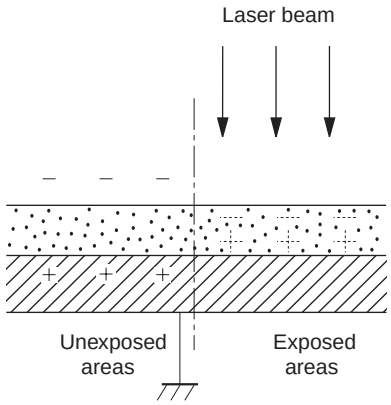
F-2-10

Step 1: Primary charging
A uniform negative potential is applied to the drum surface in preparation for latent image formation, in this step.
The primary charging roller is made with conductive rubber. A DC bias is applied to the primary charging roller to keep the potential on the drum surface uniformly.



F-2-11

Step 2: Laser beam exposure
An electrostatic latent image is formed on the photosensitive drum in this step.
When the laser beams scan a negatively charged drum surface, it causes the charges in areas struck by the laser beams to be neutralized. An electrostatic latent image is formed in areas on the drum where the negative charges are eliminated.

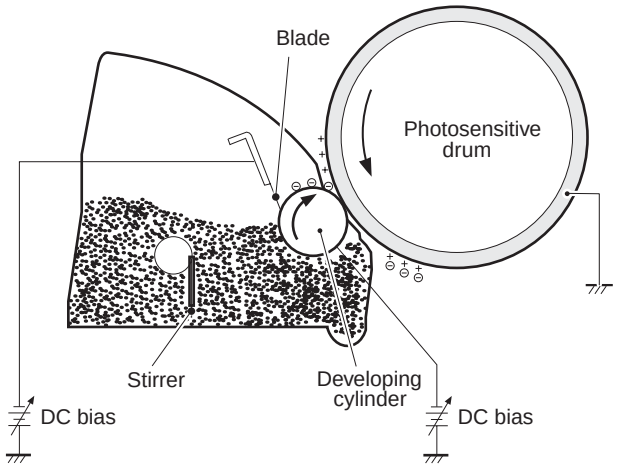


F-2-12

2.4.1.4 Developing block

0005-8938

This block is comprised of two steps (see Step 3 and Step 4). In this block, the image becomes visible by utilizing a developing method called contact development method, where the toner is transferred onto the electrostatic latent image on the drum surface. In this method, developing cylinder adheres closely to the photosensitive drum to push up the toner.
Toner (development agent) used in this printer is non-magnetic single-component toner, composed of resins, etc.



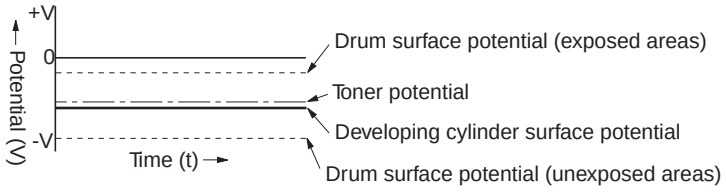
F-2-13

Step 3: Auxiliary development
In this step, CPU applies DC bias onto the toner that was not charged by frictional electrification. Here, the toner becomes uniformed negative potential.

The printer charges the uncharged toner by applying DC bias onto the blade inside the toner cartridge.
The DC bias is also used as developing bias.

Step 4: Development
The toner is adhered onto an electrostatic latent image on the photosensitive drum in this step.
The toner is insulators, and acquires a negative charge by friction due to the rotating cylinder and the blade.
When the negatively charged toner makes contact with the drum, exposed areas on the drum are more positively charged than that on the cylinder. Then the toner charged about the same as the cylinder adheres onto the exposed areas on the drum. The latent image on the drum becomes visible.

⚠ Although the charges on the exposed area on the drum are shown as positive in follow, in actuality, they are negative. However, they are more positive than the charges on the cylinder.



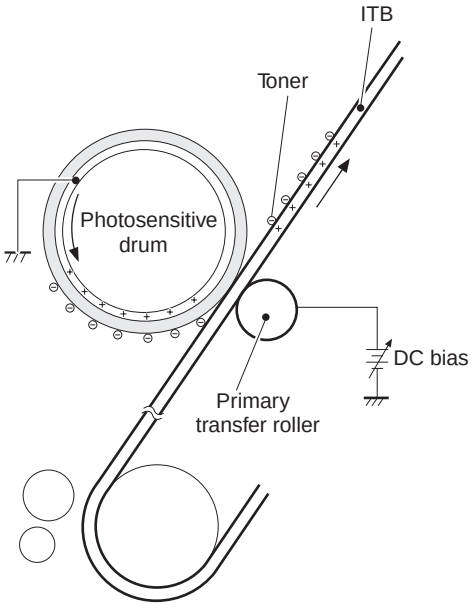
F-2-14

2.4.1.5 Transfer block

0005-8940

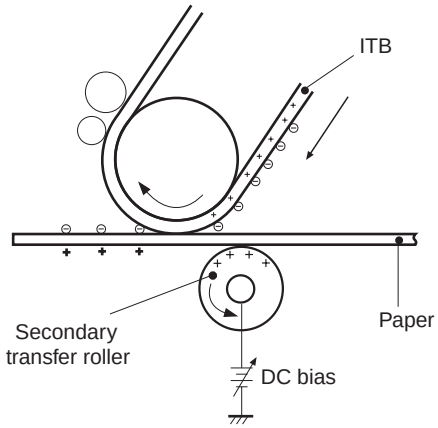
This block comprises three steps, which transfers the toner image on the drum surface onto paper.

Step 5: Primary transfer
The toner on the drum is transferred onto the ITB in this step.
A DC positive bias is applied to the primary transfer roller opposite to the drum in order to charge the ITB positively. Then the negatively charged toner on the drum is transferred onto the positively charged ITB. This procedure is repeated for each color (Y, M, C, Bk).
In full-color printing, as toners in four colors are piled up on the ITB, the holding force of the toner weakens as the transfer process progresses for the 1st color, 2nd color... Therefore, after transferring the first color, the DC positive bias is increased for each color in order to supplement the holding force of the toner.



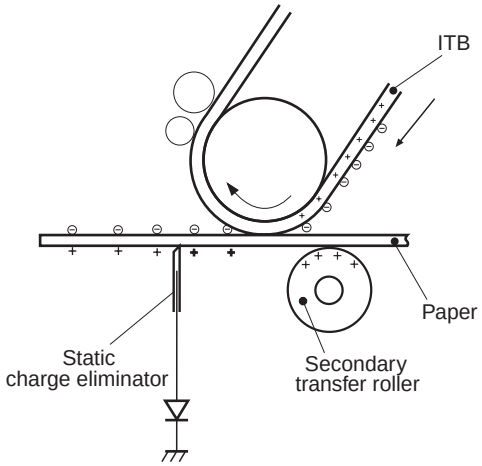
F-2-15

Step 6: Secondary transfer
The toner on the ITB is transferred onto paper in this step.
A DC positive bias is applied to the secondary transfer roller to charge the back side of a fed paper. This allows the toner on the ITB to transfer onto paper positively.
At the completion of secondary transfer, a DC negative bias is applied to the secondary transfer roller to avoid soiling the back of paper with the toner on the ITB.



F-2-16

Step 7: Separation
The elasticity of paper causes the paper to separate from the ITB in the step.
This printer utilizes the static charge eliminator to reduce the charge on the back of paper, and weaken the electrostatic adhesion of the paper and facilitate separation. This makes a separation operation easier.

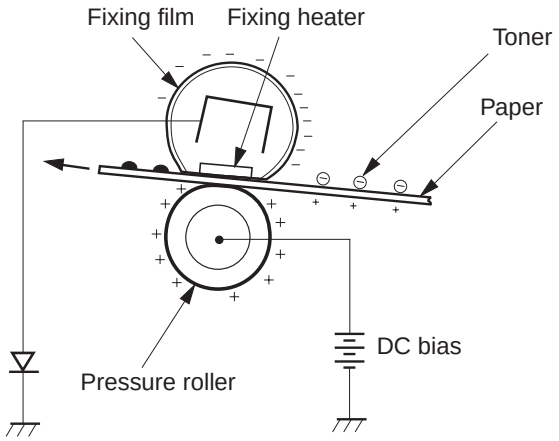


F-2-17

2.4.1.6 Fixing block

0007-8134

A toner image transferred onto paper in the transfer block can be smeared easily by hands since only the electrostatic attraction holds the image on paper. The toner on paper is melted and mixed by heat and pressure applied to it and then the image becomes permanent.
Step 8: Fixing
The machine uses an on-demand method, which requires a low thermal capacity. The method enables the machine to start up quickly and its heater to use little power while the machine is in a standby state. The machine may therefore be characterized by a short wait time and low energy consumption.
The machine applies a positive DC bias to its pressure roller for the purpose of reinforcing the retention of toner on print paper, consequently preventing stray toner. Moreover, to prevent offset from the fixing film, the film surface is given a fluorine coating. The sleeve of the fixing film is made of rubber.



F-2-18

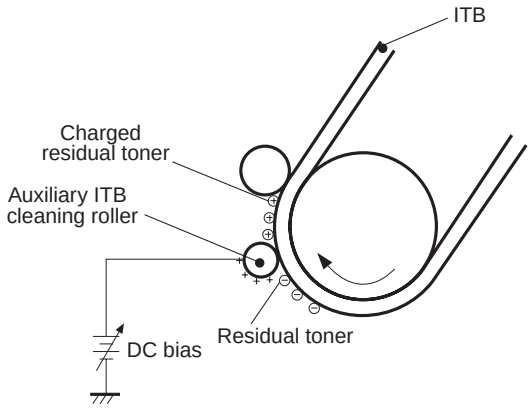
2.4.1.7 ITB cleaning block

0005-8943

The ITB and drum are cleaned in this block by returning residual toner on the ITB into the waste toner case through the drum, as a preparation for the next print operation.
This block comprises the following four steps:

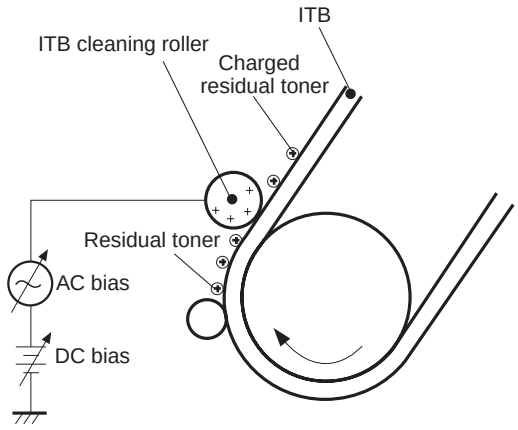
⚠ Residual toner
In the secondary transfer step, not all the toner on the ITB is transferred onto paper. Some toner remains on the ITB. This toner is called the residual toner.

Step 9: Auxiliary ITB cleaning roller charging
In this step, the holding force of the residual toner on the ITB is strengthened to prevent the toner from falling from the ITB and scattering in the printer. A DC positive bias is applied to the auxiliary ITB cleaning roller to charge the residual toner on the ITB positively. Then the residual toner is pressed to the ITB.



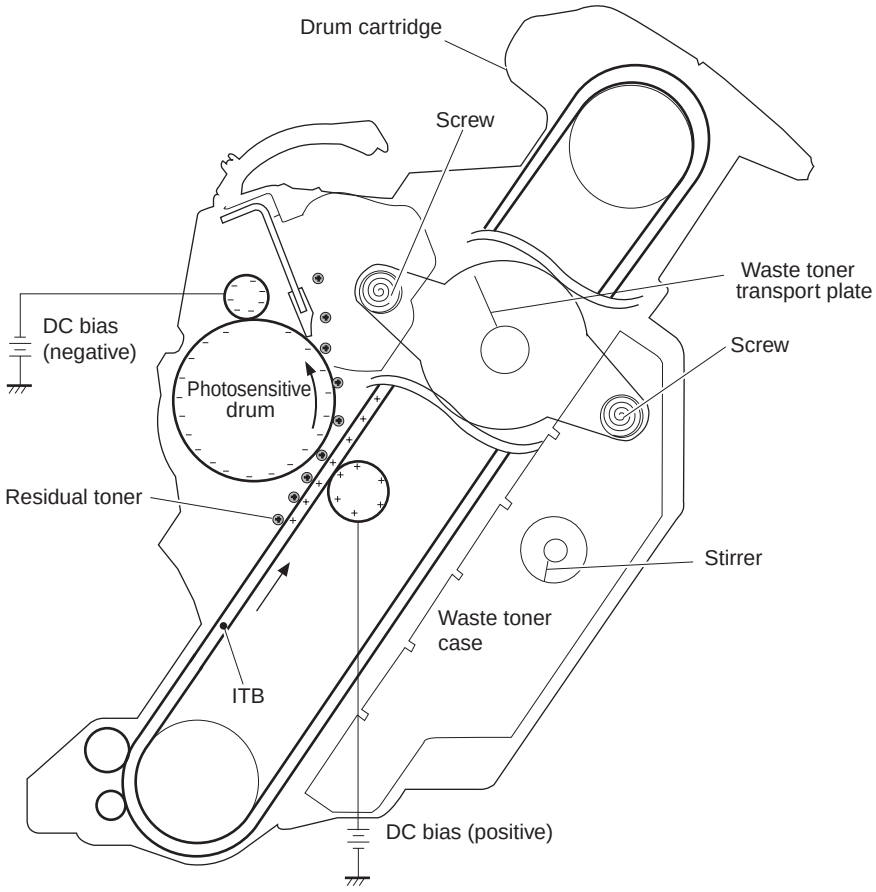
F-2-19

Step 10: ITB cleaning roller charging
The residual toner on the ITB is charged uniformly positively in this step.
A DC positive bias and AC bias are applied to the ITB cleaning roller in order to apply positive charges to the residual toner. This will make the next step, ITB cleaning, easier.



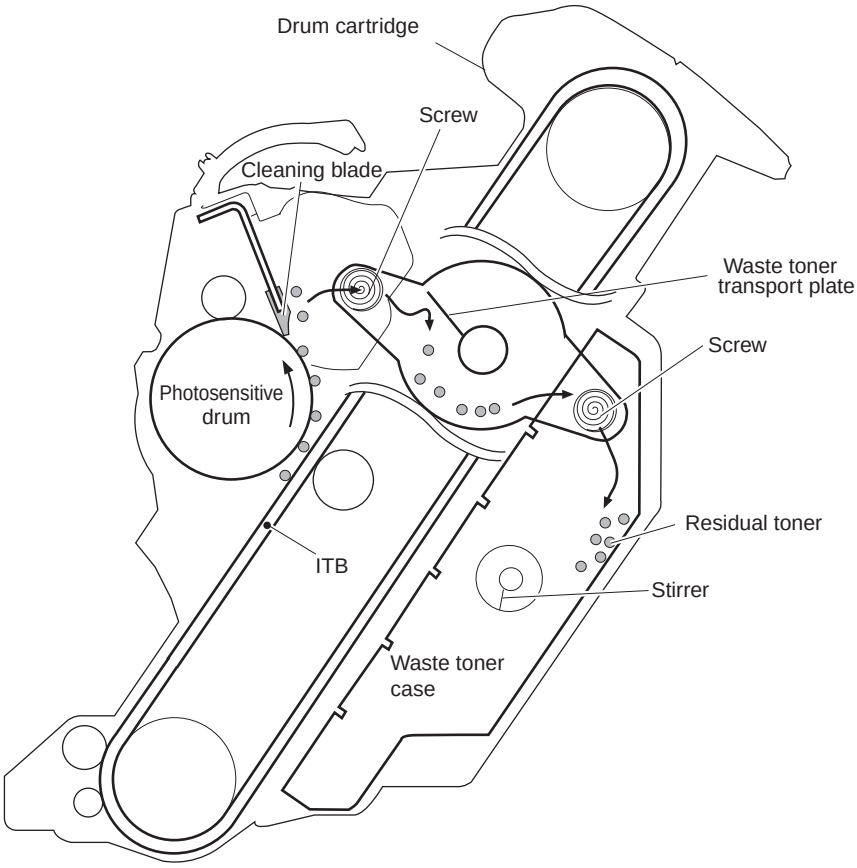
F-2-20

Step 11: ITB cleaning
The positively charged residual toner on the ITB is returned to the drum in this step. A potential difference is produced between the drum and the ITB by applying a DC positive bias onto the ITB and a DC negative bias onto the drum, to return the residual toner to the drum.



F-2-21

Step 12: Drum cleaning
In this step, the residual toner is cleaned from the drum to prepare for the next print operation.
The residual toner on the drum is scraped away with the cleaning blade. The removed toner is collected with the waste toner screws into the waste toner case. This allows the drum surface to be cleaned.



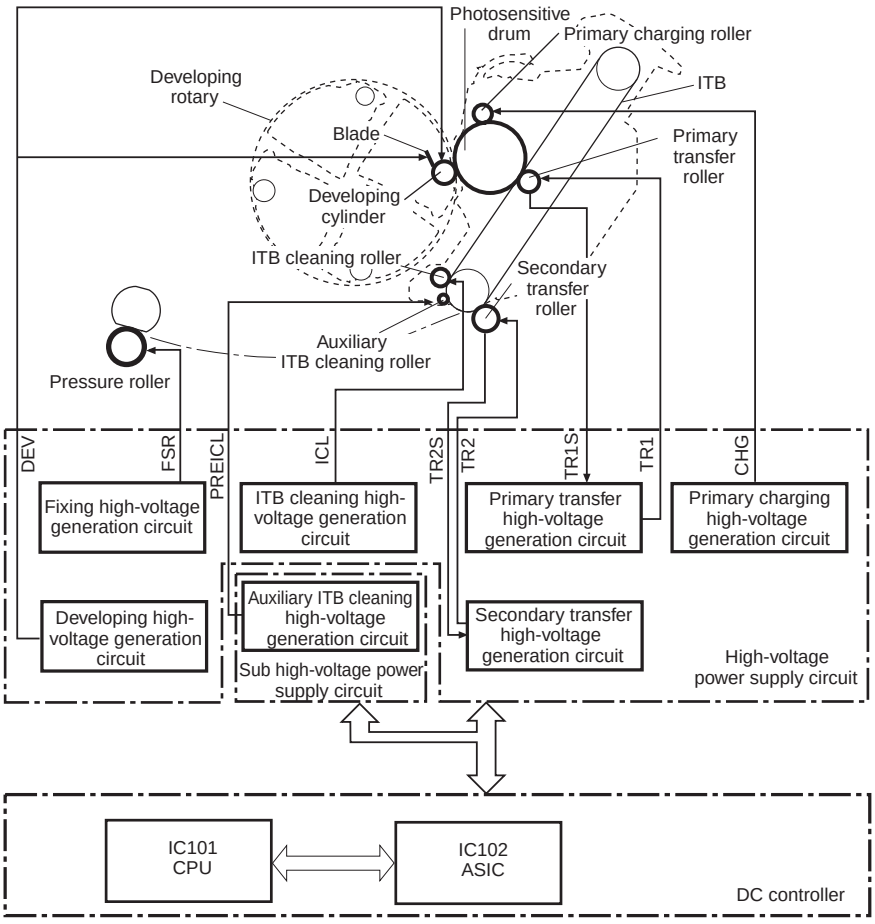
F-2-22

2.4.2 High-Voltage Control

2.4.2.1 Outline

0007-9291

The image formation system, which serves as the nerve center of the printer, forms a toner image on paper.
It consists of a developing cylinder, four toner cartridges containing toner, a drum cartridge containing the ITB, photosensitive drum, etc., a developing rotary storing the toner cartridges, and a fixing unit, etc. These parts are controlled by the DC controller.
After receiving a print command from the interface controller, the DC controller controls the developing rotary, laser/scanner unit, high-voltage power supply circuit to form an image based on the VIDEO signals on paper.
The toner cartridges and drum cartridge come with built-in memory tags that store cartridge usage condition information, etc. The DC controller performs reading and writing.



F-2-23

2.4.2.2 Primary charging bias generation

0005-8731

The primary charging bias is output to apply uniformed negative potential to the photosensitive drum surface as a preparation for image formation.
Two kinds of the biases, DC negative bias and AC bias, are generated in the primary charging high-voltage generation circuit in the high-voltage power supply circuit. These two biases are applied together to the primary charging roller in the drum cartridge with a specified timing.
The values of the DC negative bias vary interlocked with the developing bias according to image density information sent from the video controller.

Auxiliary developing bias is output to charge toner that was not charged by friction.
The printer's auxiliary developing bias is DC minus bias generated at auxiliary developing bias generation circuit inside high-voltage printed circuit board.
Auxiliary developing bias is applied onto the blade in the toner cartridge at a specified timing.

2.4.2.3 Developing bias generation

0005-8732

The developing bias is output to adhere toner to an electrostatic latent image formed on the photosensitive drum.
This bias is a DC negative bias generated in the developing high-voltage generation circuit in the high-voltage power supply circuit. The bias is applied to the developing cylinder in the toner cartridge with specified timing.
The values of the developing bias vary according to image density information sent from the video controller. This allows the adjustment of image density.
The developing bias is output to charge toner that was not charged by friction.
This bias is applied onto the blade in the toner cartridge at a specified timing.

2.4.2.4 Primary transfer bias generation

0005-8735

The primary transfer bias is output to transfer a toner image on the photosensitive drum to the ITB in the drum cartridge.
Two kinds of the biases, DC positive bias and DC negative bias, are generated in the primary transfer high-voltage generation circuit in the high-voltage power supply circuit. The DC positive bias is output to the primary transfer roller in toner transfer. The DC negative bias is out-put to it in ITB cleaning.
The high-voltage power supply circuit applies these primary transfer biases to the primary
transfer roller according to a sequence.
The following are the biases applied at each sequence:
- Print bias (Note) (DC positive):
  This bias is applied to the primary transfer roller to transfer a toner image on the photosensitive drum to the ITB in a print sequence.
- Cleaning bias (DC negative):
  This bias is applied to the primary transfer roller to return residual toners adhered on the ITB to the photosensitive drum in a warm-up or last rotation sequence.
  The values of the primary transfer bias vary according to the DC controller.
  The DC controller changes the amperage of the primary transfer bias according to the PRIMARY TRANSFER CURRENT FEEDBACK (TR1S) signal sent from the primary transfer high-voltage generation circuit and performs rated current control.

⚠ In full-color printing, as four toner layers in each colors are piled up on the ITB in primary transfer, the holding force of toner weakens as the transfer process progresses for the 1st color, 2nd color... Therefore, after transferring the first color, the primary transfer DC (positive) bias is increased for the toner in the rest of the colors to gain the holding force of the toner.

2.4.2.5 Secondary transfer bias generation

0005-8739

The secondary transfer bias is output to transfer a toner image on the ITB onto paper.
Two kinds of the biases, DC positive bias and DC negative bias, are generated in the secondary transfer high-voltage generation circuit in the high-voltage power supply circuit. The DC positive bias is output to the secondary transfer roller in toner transfer. The DC negative bias is output to it in cleaning.
The high-voltage power supply circuit applies these secondary transfer biases to the secondary transfer roller according to a sequence.
The following are the biases applied at each sequence:
- Print bias (DC positive):
  This bias is applied to the secondary transfer roller to transfer a toner image on the ITB onto paper in a print sequence.
- Cleaning bias (DC negative):
  This bias is applied to the secondary transfer roller to return residual toners adhered on the secondary transfer roller to the ITB in a warm-up or last rotation sequence.
  The values of the secondary transfer bias vary according to the DC controller.
  The DC controller changes the amperage of the secondary transfer bias according to the SECONDARY TRANSFER CURRENT FEEDBACK (TR2S) signal sent from the secondary transfer high-voltage generation circuit and performs rated current control.

2.4.2.6 Auxiliary ITB cleaning bias generation

0005-8740

The Auxiliary ITB cleaning bias is output to prevent residual toners on the ITB from falling on a paper path.
Two kinds of the biases, DC positive bias and DC negative bias, are generated in the auxiliary ITB cleaning high-voltage generation circuit in the sub high-voltage power supply circuit.
The DC positive bias is output to the auxiliary ITB cleaning roller to charge residual toners on the ITB positively. The DC negative bias is output to the auxiliary ITB cleaning roller to clean negatively charged residual toner on the roller.
The Sub high-voltage power supply circuit applies these auxiliary ITB cleaning biases to the auxiliary ITB cleaning roller during the cleaning period with specified timing.

2.4.2.7 ITB cleaning bias generation

0005-8748

The ITB cleaning bias is output to clean the ITB.
Three kinds of the biases, DC positive bias, DC negative bias, and AC bias, are generated in the ITB cleaning high-voltage generation circuit in the high-voltage power supply circuit.
The AC bias and DC positive bias are output to the ITB cleaning roller to clean positively charged residual toners on the ITB. The AC bias and DC negative bias are output to the ITB cleaning roller to clean negatively charged residual toners on the roller.
The high-voltage power supply circuit applies these ITB cleaning biases to the ITB cleaning roller during the cleaning period with specified timing.

2.4.2.8 Fixing Bias Generation

0007-9199

The fixing bias is generated and used to prevent adhesion to the fixing sleeve of toner that is on print paper before fixing takes place.
The fixing bias is a DC positive bias generated in the fixing height-voltage generation circuit of the high-voltage power supply PCB. It is applied to the pressure roller of the fixing assembly at such times as programmed in advance.

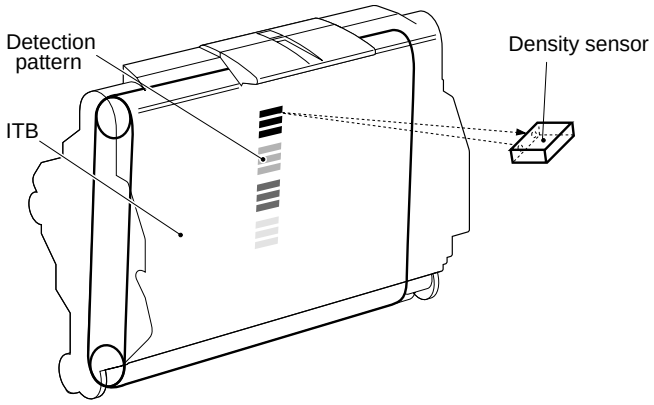
2.4.3 Image Stabilizaton Control

2.4.3.1 Outline

0005-8784

This printer performs image stabilization control using the image density detection function (see note) in order to reduce image density variations caused by changes in environments, deterioration of the drum or toner, etc.
Two kinds of the image stabilization controls, image density calibration (D-max) control and image halftone calibration (D-half) control, are executed as necessary.
Specified conditions to perform image stabilization calibration control are listed in the following:
- Power is turned on.
- Cartridge is replaced.
- After printing 800 images or more (mono color: 800 pages, full color: 200 pages)
- After 12 hours in the absence of a print command
- In response to a command for execution from the video controller

⚠ Image density detection function
This printer has functions of striking light to image density patterns in each color formed on the ITB and measuring the density of the patterns from the amount of reflected light.
The DC controller emits light from the density sensor and strikes the light to each detection pattern. Then the reflected light off the patterns is received at a light receiver and returned to the DC controller as the IMAGE DENSITY signals.
The DC controller converts the input IMAGE DENSITY signals (analog values) to density values (digital values) and stores them.



F-2-24

If the DC controller cannot receive any light at the light receiver during image density detection, and notifies a density sensor abnormality warning to the video controller.
If values detected with the density sensor is out of a specified range, the DC controller initializes the image density and notifies an image density out of guaranteed range warning to the video controller.

2.4.3.2 Image density calibration (D-max) control

0005-8787

This control is performed to stabilize the image density of the printer engine.
The DC controller forms density patterns in each color on the ITB as varying the developing bias when specified conditions are met. Then the DC controller measures the density of the patterns with the density sensor and controls the developing bias to obtain a proper density based on the measured density.

2.4.3.3 Image halftone calibration (D-half) control

0005-8791

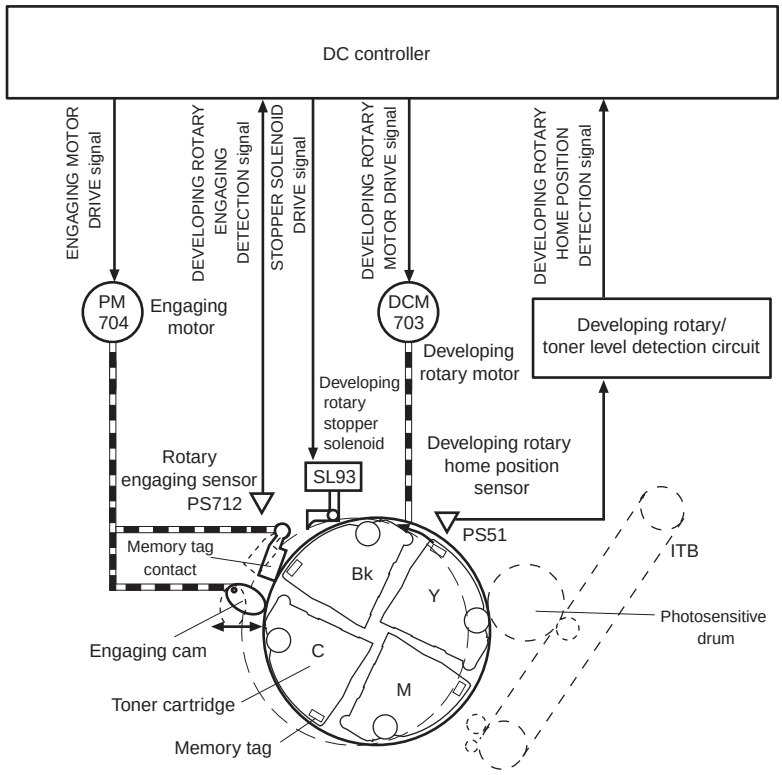
This control is utilized to measure a halftone density output from the video controller in order for the interface controller to perform halftone calibration, and to return the measurement results to the interface controller.
The DC controller forms image detection patterns for each color on the ITB with a proper developing bias specified in the D-max control based on image data sent from the interface controller. Then the DC controller measures the patterns with the density sensor and returns image data to the video controller. The interface controller performs the halftone calibration to obtain an ideal halftone image based on data.

2.4.4 Developing Rotary

2.4.4.1 Outline

0005-8704

The developing rotary has a function of moving a toner cartridge to a specified position. There are four toner cartridges (Y, M, C, Bk) stored in the rotary. The rotary is illustrated in the figure below.



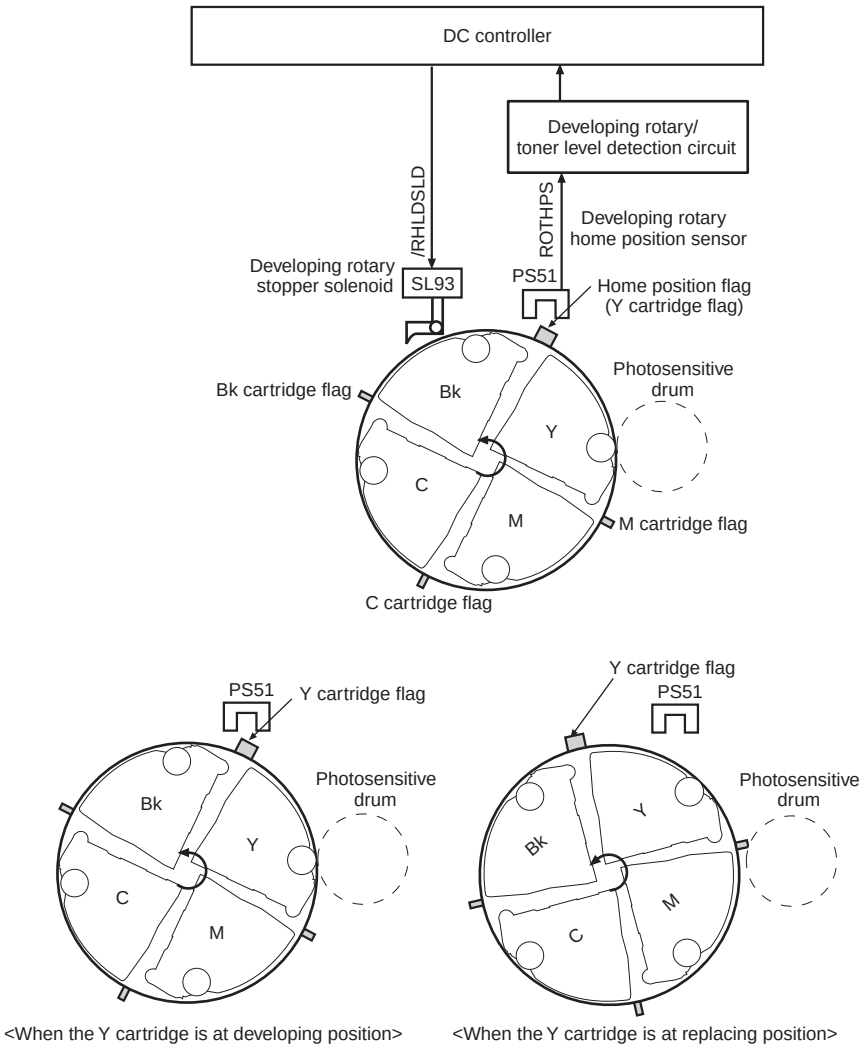
F-2-25

The developing rotary motor (DCM703) rotates the rotary so that the EP-87 toner cartridges in each-color face the drum one by one. As the rotary stops, the developing rotary stopper solenoid (SL93) is driven to lock the rotary.
The rotary performs engaging operations of the rotary and of the memory tag contacts, with the engaging motor (PM704). (See the memory tag engaging control on page 2-60 for details on an engaging operation of the memory tag contacts.)
There are two sensors for the rotary, which performs position detection and engaging detection.
The functions the rotary has are described next.

2.4.4.2 Developing rotary rotation control

0005-8709

This control is utilized to rotate the rotary during a print or toner cartridge removal operation in order to move each toner cartridge to its specified position.
The DC controller moves the rotary by turning on/off the developing rotary motor (DCM703) as monitoring the position of the rotary with the developing rotary home position sensor (PS51). When the rotary stops, the DC controller drives the developing rotary stopper solenoid (SL93) to lock the rotary.
The DC controller monitors the PS51 to determine the stopping position of the rotary. It detects the position of the rotary from time for four cartridge flags located on the left side of the rotary to pass the PS51.
The four cartridge flags are for detecting the developing positions for each cartridge. The DC controller determines a cartridge developing position when these flags interrupt the PS51, and stops the rotation of the DCM703.
The flags are used for detecting the removing position for each cartridge also. The DC controller rotates the DCM703 for a specified period from the position at where each flag interrupts the PS51 and then stops it. This position will be a removing position for each cartridge.
The DC controller will assume any of the following conditions to be a fault in the developing rotary locking mechanism and will stop the printer engine and, at the same time, communicate the fact to the video controller:
1) The home position detecting flag cannot be detected by PS51.
2) A fault exits during the period of detection between flags by PS51.

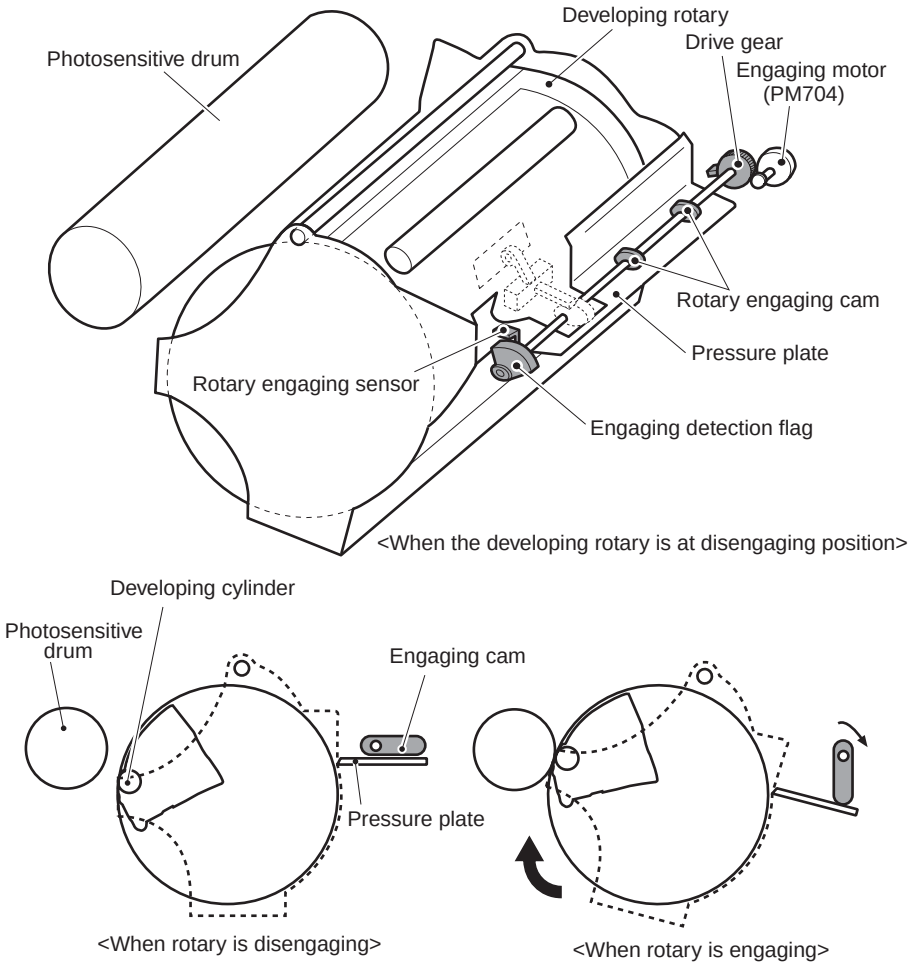


F-2-26

2.4.4.3 Developing rotary engaging control

0005-8714

This control is utilized to engage a developing cylinder in the rotary to the drum in order to transfer the toner image on the drum onto the ITB.
In rotary engaging control, the DC controller switches the rotational direction of the engaging motor (PM704) and moves the rotary to either of two positions, engaging position and disengaging position.
At the time of rotary engaging (travelling from a disengaging position to an engaging position), the DC controller rotates the engaging motor clockwise for a specified period. This allows the rotary engaging cam to rotate and then the engaging plate is pressed out. The developing cylinder is engaged to the drum.
At the time of rotary disengaging (travelling from an engaging position to a disengaging position), the DC controller rotates the engaging motor counterclockwise and instructs the reverse operation of rotary engaging. Then the developing cylinder is disengaged from the drum.
A mechanism used in this control is also used in a memory tag contact engaging operation.
Developing rotary position detection is performed by the DC controller monitoring the rotary engaging sensor (PS712).

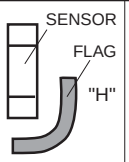
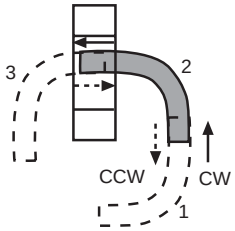
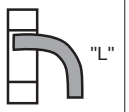


F-2-27

2.4.4.4 Developing rotary position detection

0005-8719

This printer has a function of detecting the rotary engaging position between the rotary and drum determined in the developing rotary engaging control. This detection is performed by the DC controller monitoring the output of the engaging sensor (PS712). The DC controller determines either of three modes: print, initial, and memory tag communication, from whether the engaging detection flag located on the end of the drive gear shaft interrupts the PS712.

Status / Mode	Developing rotary	Memory tag contact	Rotary engaging sensor (PS712)	Relationship between the rotational direction of the engaging motor and the position of the sensor flag
1. Print mode	Engaging	Disengaging		
2. Initial mode	Disengaging	Disengaging		
3. Memory tag communication mode	Disengaging	Engaging		

F-2-28

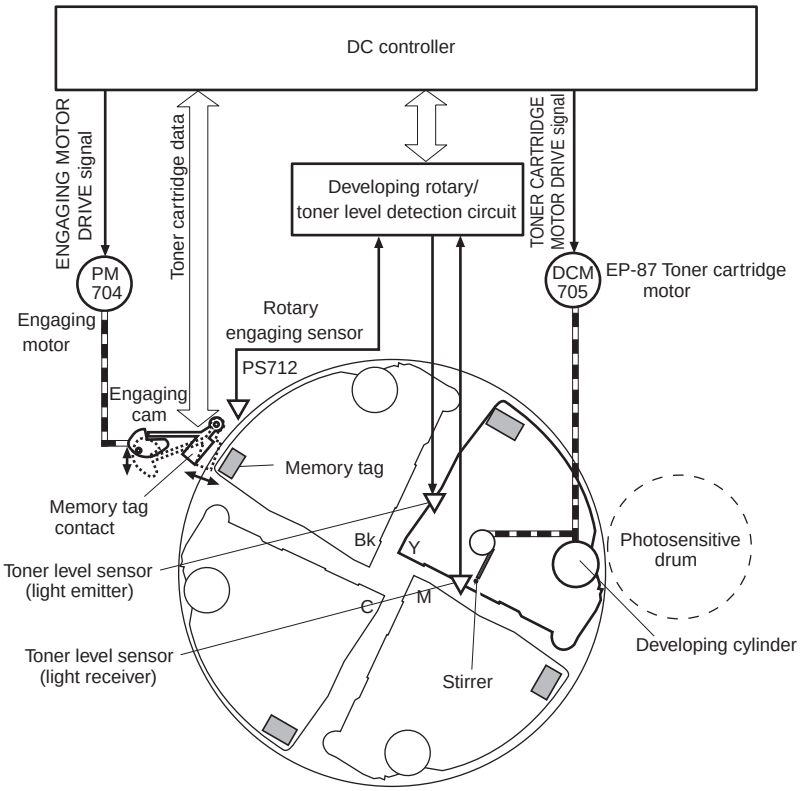
When the power is turned on or the top cover is closed, the DC controller executes as follows based on the output of the PS712.
When the output of the PS712 is "H", the DC controller determines that the printer is in print mode (#1 in the table above) and rotates the engaging motor clockwise for a specified period to switch the mode to initial mode in order to prepare for the next operation. When the output is "L", the DC controller cannot determine whether the printer is in initial mode (#2 in the table above) or memory tag communication mode (#3 in the table above). In such a case, the DC controller rotates the engaging motor counterclockwise for a specified period to switch the mode to print mode. Then it rotates the motor clockwise for a specified period to switch the mode to initial mode. The DC controller detects mode the printer is actually in from the detection results of the PS712 and prepare for the next operation.
The DC controller determines a developing rotary engaging mechanism abnormality, stops the pirnter engine, and notifies it to the video controller under the following conditions in engaging failure detection:
1) The PS712 does not output "L" even if the engaging motor rotates counter clockwise for a specified period (0.2 seconds) at developing rotary disengaging.
2) The PS712 does not output "H" even if the engaging motor rotates clockwise for a specified period (0.2 seconds) at developing rotary engaging.

2.4.5 Toner Cartridge

2.4.5.1 Outline

0005-8724

The toner cartridge has a function of forming a visible image on the drum with toner.
There are four toner cartridges in Y, M, C, and Bk, which are the same in structure.
The following indicates the configuration of the cartridges and loads.



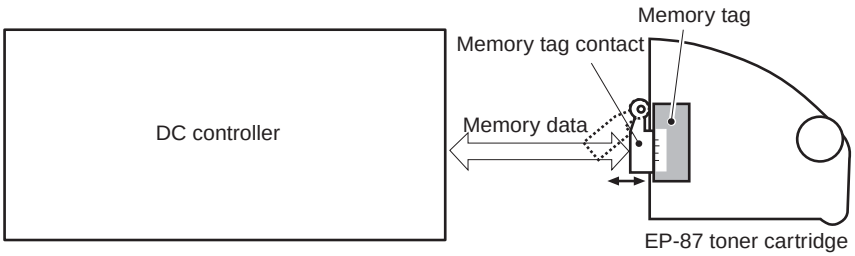
F-2-29

This toner cartridge is structured with a developing cylinder, and stirrer. The toner cartridge motor rotates these parts.
The memory tag is installed in each cartridge. The engaging motor rotates as required to operate the memory tag contact cam. This allows the memory tag contact on the printer side and that on the cartridge side to contact each other, and enables the DC controller to communicate with each toner cartridge.
Toner level detection is performed with an LED (light emitter) and a photodiode (light receiver) on the developing rotary/toner level detection circuit.
The functions and controls that the cartridge have are described next.

2.4.5.2 Memory tag

0005-8728

The memory tag is a non-volatile memory built into the toner cartridge. It stores cartridge usage condition data. The DC controller reads and writes memory data constantly to detect the usage conditions of each toner cartridge.
The DC controller reads and writes to the memory tag through the memory tag contacts.
The memory tag contacts are disengaged from the memory tag normally. However, when the DC controller reads and writes to the memory tags in each toner cartridge, it performs memory tag contact engaging control. The DC controller starts memory data communication as the toner cartridge contacts with the memory tag contact. After receiving memory data, the DC controller updates the information with specified timing and writes it to the memory tags for each cartridge.
The DC controller instructs the memory tag to read or write under the following conditions:
<Read>
- Power is turned on.
- Top cover is closed.
<Write>
- After 50 papers printing.
- When a Change Has Occurred to the Data on the Lives of Parts.



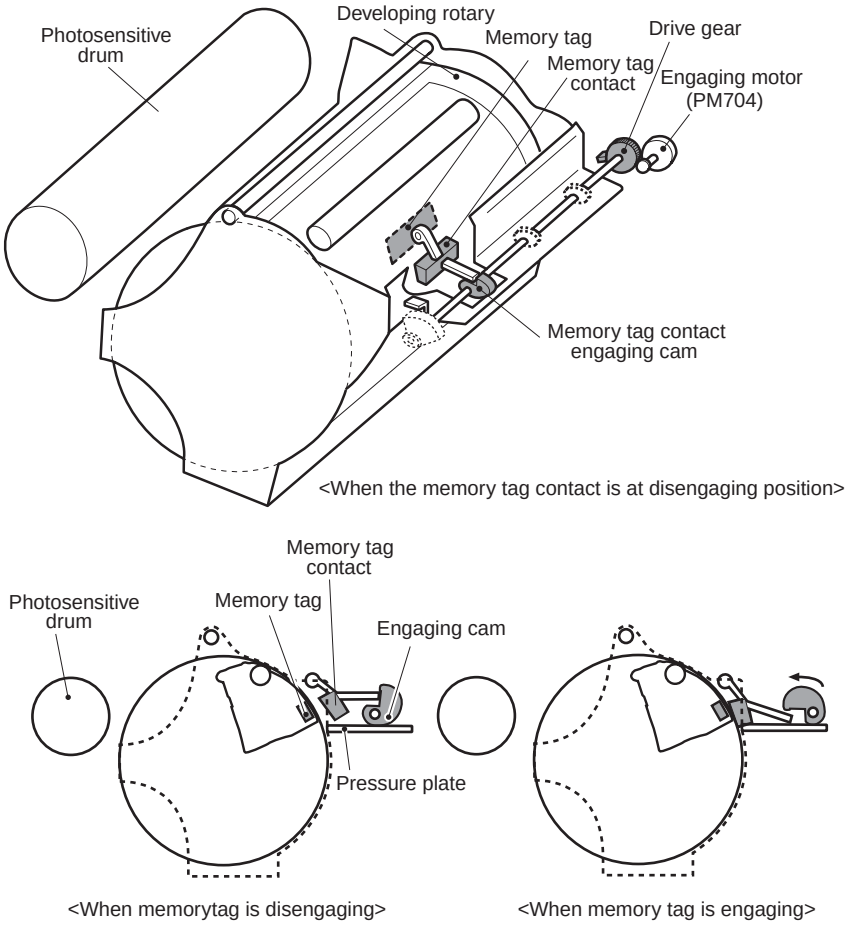
F-2-30

2.4.5.3 Memory tag contact engaging control

0005-8733

This control is utilized to contact memory tag contacts on the printer side with that on the toner cartridge side in order to enable communication between the memory tags in each toner cartridge and the printer.
The DC controller moves the memory tag contact to either of two positions, engaging position or disengaging position, by switching the rotational direction

of the engaging motor (PM704).
At the time of memory tag contact engaging (travelling from a disengaging position to an engaging position), the DC controller rotates the engaging motor counterclockwise for a specified period. This allows the memory tag contact engaging cam to rotate. Then the contact is pressed out and engaged to the memory tag.
At the time of memory tag contact disengaging (travelling from a engaging position to a disengaging position), the DC controller rotates the engaging motor counterclockwise and instructs the reverse operation of the contact engaging. This allows the contact to be disengaged from the memory tag.
A mechanism used in this control is also used in a developing rotary engaging operation.
The developing rotary position detection is also performed by the DC controller monitoring the rotary engaging sensor (PS712).



F-2-31

2.4.5.4 Cartridge presence detection

0005-8736

This detection is utilized to detect the presence of the cartridge.
When the power is turned on or the top cover is closed, the DC controller reads in data (cartridge ID) from the memory tags in each toner cartridge. When the DC controller successfully reads data, it determines a cartridge presence.
If the DC controller determines a cartridge out, it notifies the error to the video controller.

2.4.5.5 Toner cartridge life detection

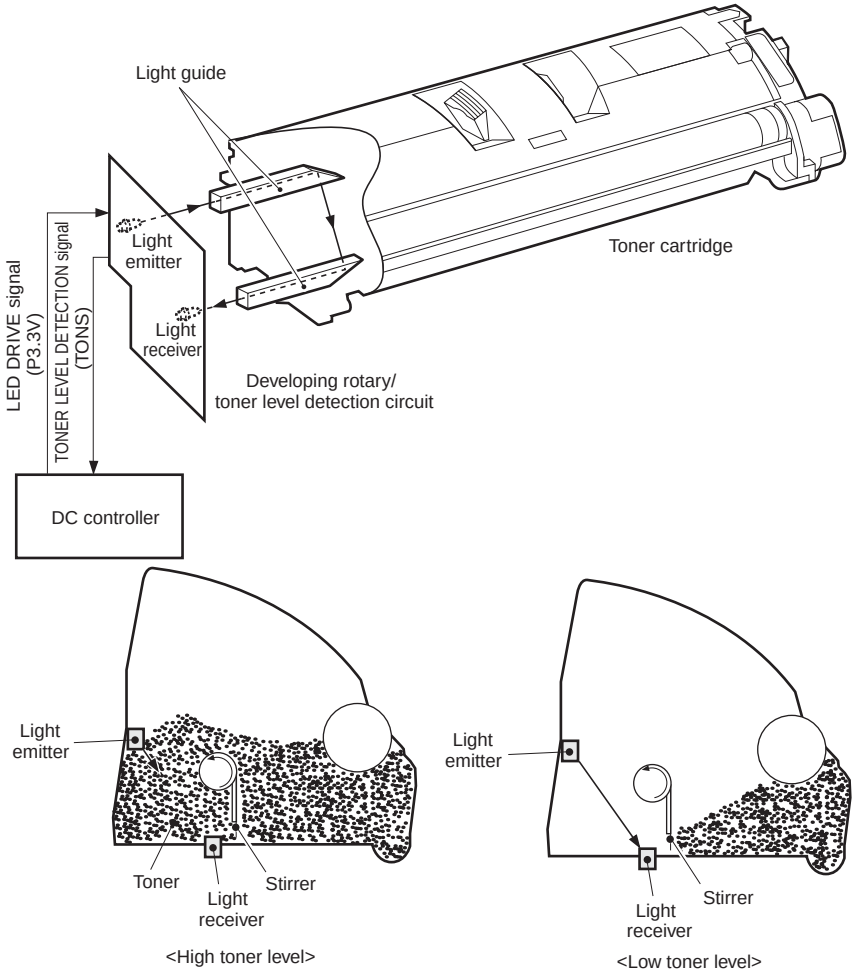
0005-8738

a. Outline
This detection is utilized to detect whether the toner cartridge has reached the end of its life.
When the power is turned on or the top cover is closed, the DC controller monitors the following two items. It determines an toner cartridge end-of-life if either of the items reaches its specified value.
a. Developing cylinder life (usage hour)
b. Toner level
The life of the toner cartridge is indicated to the video controller in 2 steps (warning, end of life); the printer engine will be stopped only when the end of life has been reached. The life of the developing cylinder and the level of remaining toner are checked as follows:

b. Developing cylinder life detection
The life of the developing cylinder is detected by the DC controller monitoring the cumulative usage hours of the developing cylinder, which stored in the memory tag.
Developing cylinder usage hour (DC application time) data sent from the DC controller is written in the memory tag in the toner cartridge. The DC controller updates data with specified timing. If updated data, developing cylinder cumulative usage hours, reaches a specified value, the DC controller determines a developing cylinder end-of-life.

c. Toner level detection
This printer utilizes a through-beam sensor for toner level detection.
The toner level is detected by the DC controller monitoring the toner level detection unit structured with a light emitter (LED) and a light receiver (PD)

(Note:1).
After the start of a print operation, the DC controller emits light from the LED with the LED DRIVE (P3.3V) signal. The light emitted from the light emitter passes through the light guide in the cartridge and enters into the cartridge. The light passes through it and again the light guide. Then the light is detected at the light receiver and output as the TONER LEVEL DETECTION (TONS) signal to the DC controller. The DC controller detects the toner level from the cumulative detection time of the TONS signal during one rotation of the stirrer in the cartridge.
The DC controller determines that the toner level is low when the cumulative detection time of the TONS signal exceeds a specified value (Note:2).



F-2-32

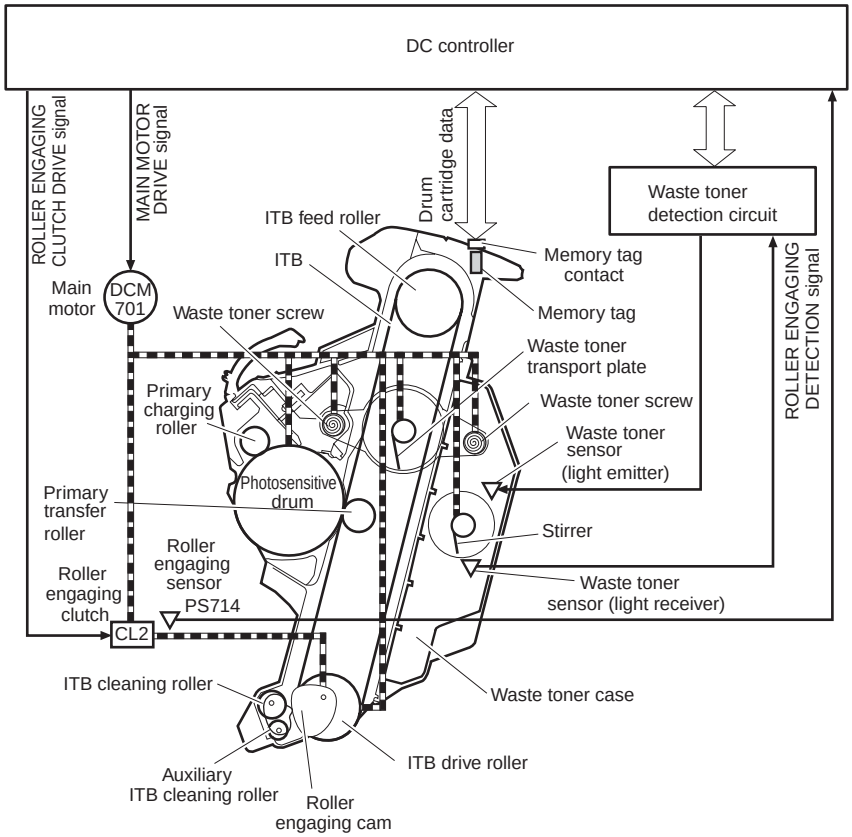
Note 1. In full-color printing, the detection is performed for the cartridges in each color. In monochrome printing, it is performed just for the Bk cartridge.
Note 2. If the toner level written in the memory tag is lower than the detected toner level, data is not updated.

2.4.6 Drum Cartridge

2.4.6.1 Outline

0005-8744

A drum cartridge has a function of forming a toner image on the ITB.
The drum cartridge and ITB unit are integrated, as distinct from current models, into the drum cartridge.
The following indicates the configuration of the cartridge and loads.



F-2-33

The cartridge consists of the photosensitive drum, primary charging roller, waste toner transport plate, etc. These parts are driven by the main motor (DCM701).
This cartridge performs engaging operations for two rollers, the ITB cleaning roller and auxiliary ITB cleaning roller, with the DCM701. Position detection for these two rollers are performed with a common sensor.
A memory tag is installed into the drum cartridge. The memory tag contact makes contact with the memory tag in the cartridge constantly when the cartridge is installed in the printer.
The waste toner detection is performed by an LED (light emitter) and a photodiode (light receiver) on the waste toner detection circuit.
The functions and controls of the cartridge are discussed next.

2.4.6.2 Cleaning roller engaging control

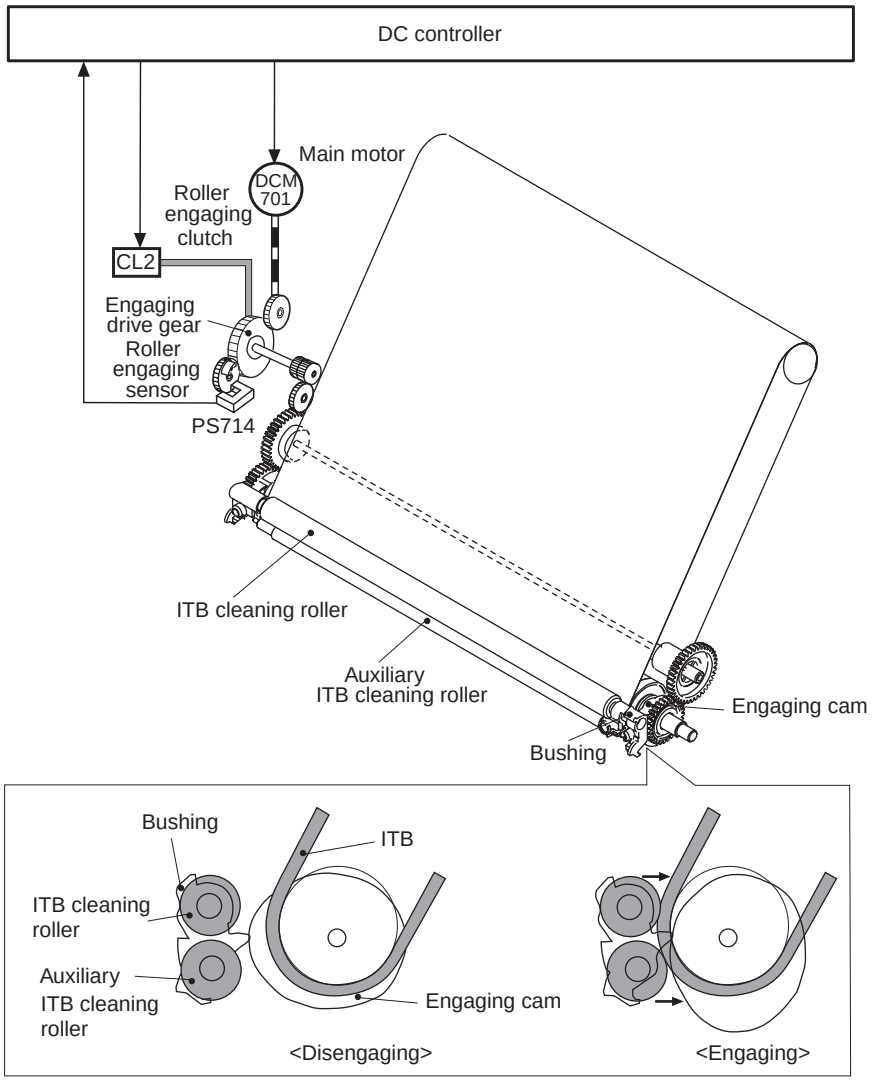
0005-8751

In this control, the two rollers, the ITB cleaning roller and auxiliary ITB cleaning roller, are engaged/disengaged from the ITB to clean residual toners on the ITB.
The operations of this control are described in the following:
1) At printing, the DC controller checks that the two rollers, ITB cleaning roller and auxiliary ITB cleaning roller, are at their home positions (Note:1) in secondary transfer roller position detection.
2) At the timing of the start of secondary transfer, the DC controller let out the roller engaging clutch (CL2). This transmits the drive of the main motor (DCM701) to the engaging cam.

Then the roller bushing is pushed out and the two rollers start to engage to the ITB.

3) At this point, the DC controller is monitoring the output of the PS714, When the output becomes "L", it lets out the CL2. This allows the cam to stop and the two rollers to stop at each engaging position.
4) After a print operation, the DC controller let in the CL2 again for 0.2 seconds. This disengages the two rollers from the ITB.
5) The DC controller monitors the output of the PS 714, When the output becomes "L", it lets out the CL2. This allows the cam to stop and the two rollers to stop at each home position. Then, it is ready for the next print operation.

Note 1. The home positions of each roller are positions at where the rollers are disengaged from the ITB by the roller bushing.
Note 2. The operation of the engaging cam used in this control is also used in the secondary transfer roller engaging control.



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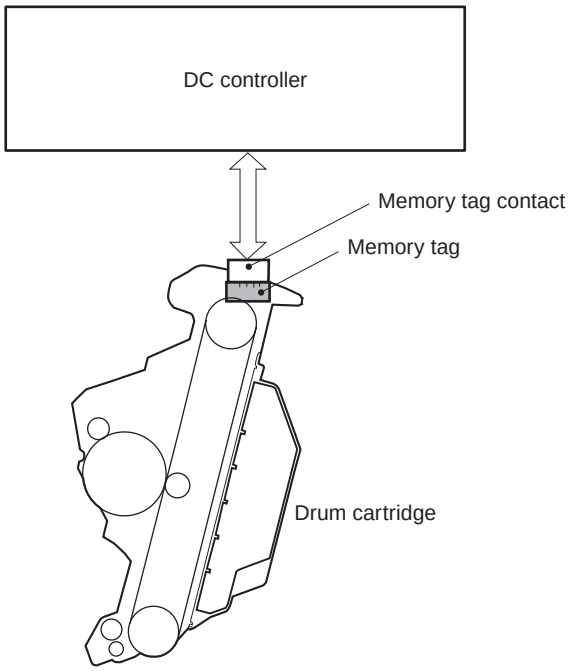
2.4.6.3 Memory tag

0005-8755

The memory tag is a non-volatile memory built into the drum cartridge. It stores cartridge usage condition data. The DC controller detects drum cartridge usage conditions by reading and writing memory data.
A memory tag in the drum cartridge contacts with the memory tag contact constantly when the cartridge is installed in the printer.
After receiving memory data from the memory tag through the memory tag contact, the DC controller updates data with specified timing and rewrites it to the memory tag.
The DC controller instructs the memory tag to read or write under the following conditions:
<Read>
- Power is turned on.
- Top cover is closed.

<Write>
- After 50 papers printing.
- When a Change Has Occurred to the Data on the Lives of Parts.



F-2-35

2.4.6.4 Detecting the ITB Home Position

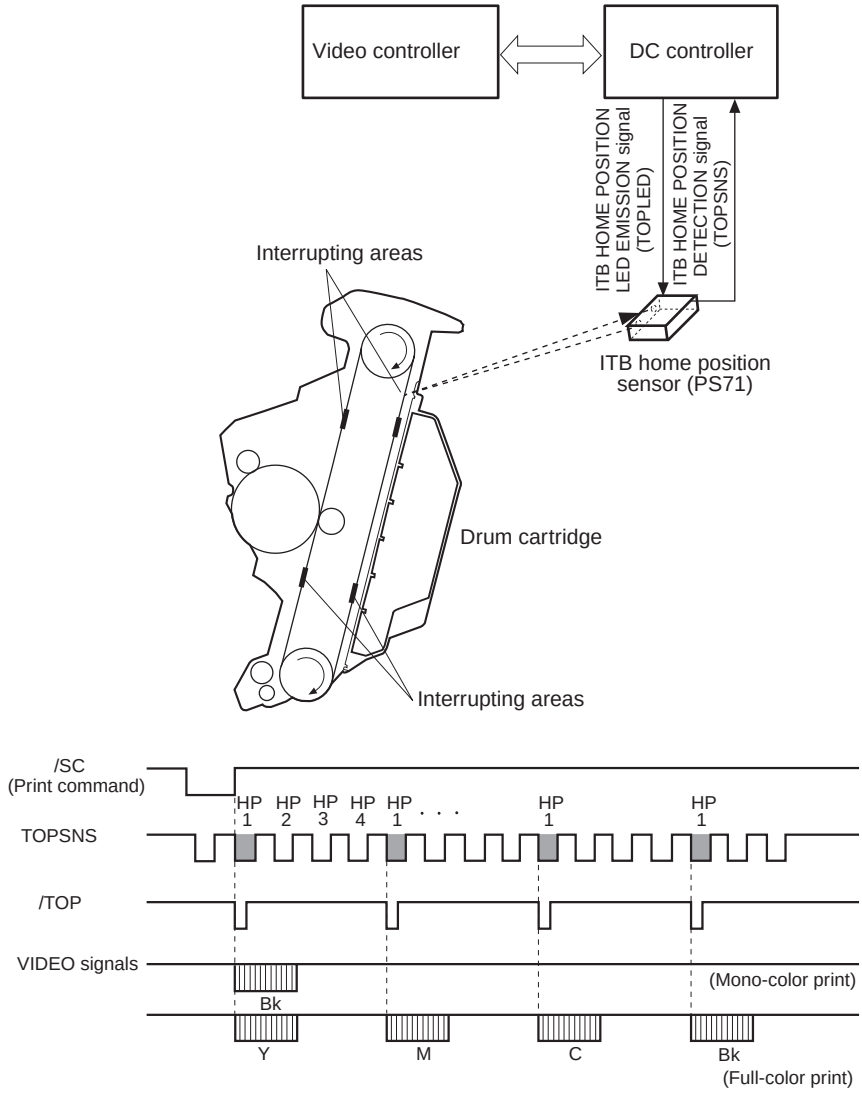
0005-8758

The machine checks the ITB home position to ensure the correct image write start position using the ITB home position sensor (PS71), which checks the position with reference to the home position detection faces (4 light-blocking faces) found on the edge of the ITB belt as follows:

1) When it receives the print command, the DC controller starts to rotate the ITB belt. When PS71 detects a light-blocking face, it sends TOPSNS to the DC controller.
2) The DC controller assumes the first TOPSNS signal to indicate the home position (HP1), and increases the count each time a new light-blocking face is detected (HP2, HP3, HP4).
3) In the case of full color operation, the DC controller uses these signals to generate the vertical sync signal (/TOP) 4 times, and sends them to the video controller. Thereafter, the DC controller receives video data of each color from the video controller 4 times, and draws images of individual colors on specific points on the ITB.

The DC controller monitors the TOPSNS signal at all times, and will identify a fault in the ITB home position sensor in the event of the following condition; as a result, it will stop the printer engine and, at the same time, will communicate the nature of the fault to the video controller.

- When the power is turned on, at the end of a print job, or the upper cover is closed, the TOPSNS signal cannot be detected at specific intervals.



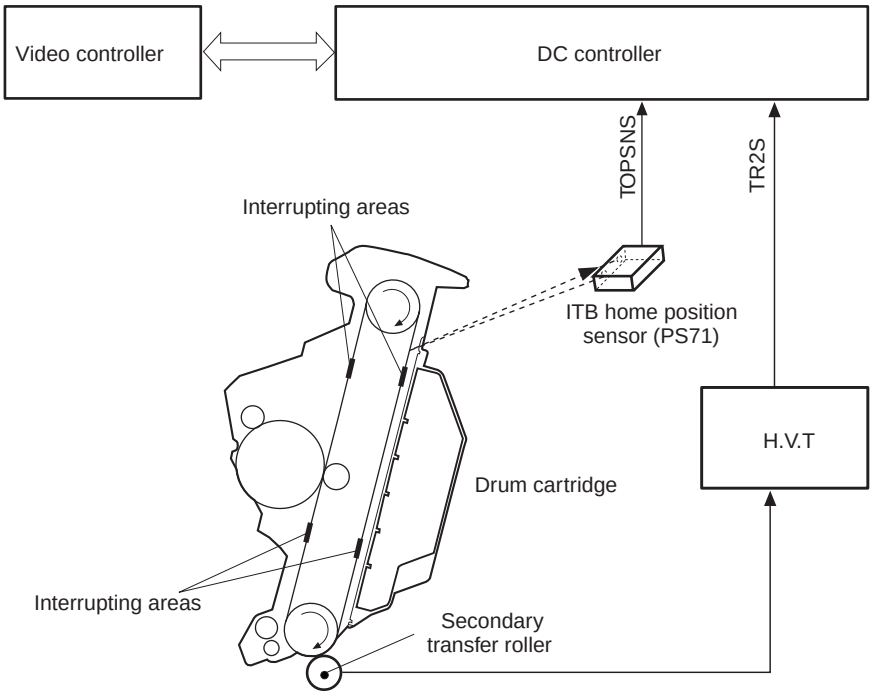
F-2-36

When the LBP5200 makes mono color prints, it decreases the distance between sheets to increase printing speed. With previous machines, the TOP signal has been generated with reference to the output of the ITB home position sensor; this machine, on the other hand, detects the TO signal with reference to the internal clock pulses of the DC controller.

2.4.6.5 Drum cartridge presence detection

0005-8761

This detection is utilized to detect the presence of the drum cartridge.
When the power is turned on or the top cover is closed, the DC controller determines the presence or absence of the cartridge by monitoring the following two items:
1) PS71 (ITB HOME POSITION DETECTION signal) outputs "L" periodically.
2) Output results from the TR2 (FEED BACK signal for secondary transfer bias) exceed a specified value.
The DC controller determines a cartridge presence only when the three conditions above are satisfied.
When the DC controller determines a cartridge absence, it stops the printer engine and notifies an drum cartridge out to the video controller.



F-2-37

2.4.6.6 Checking the Life of the Drum Cartridge

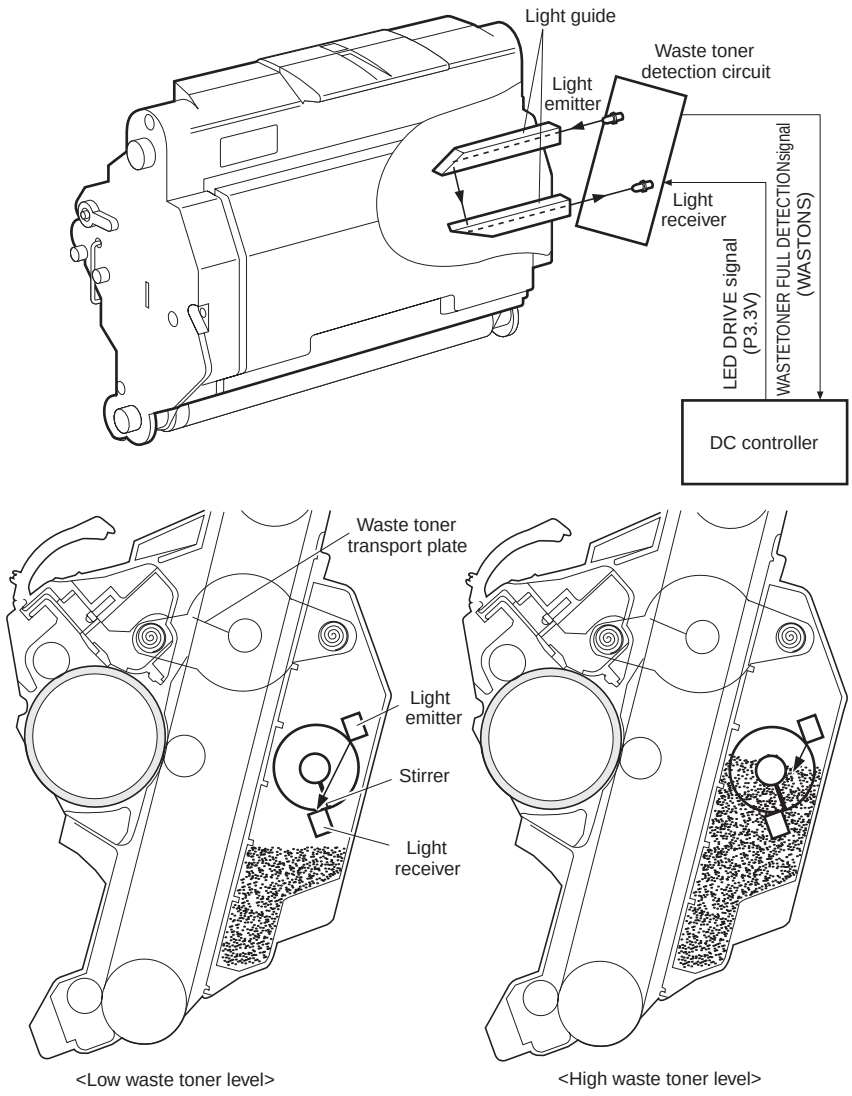
0005-8768

a. Outline
The machine uses the following mechanism to check the life of the drum cartridge.
When the power is turned on, the upper cover is closed, or a print job is over, the DC controller checks on the following 2 items, and will assume that the cartridge has reached the end of its life if any of them reaches a specific value:
- life of photosensitive drum (hours of use)
- amount of waste toner

The life of the drum cartridge is indicated to the video controller in 2 steps (warning, end of life); the printer is stopped only when the end of life has been identified.
The following mechanisms are used to detect the end of life of the photosensitive drum and the level of waste toner:

b. End of Life of the Photosensitive Drum
The end of life of the photosensitive drum is checked by the DC controller by monitoring how long the photosensitive drum has been used with reference to the data stored in the memory tag. The memory tag retains data on the period during which the photosensitive drum has been used (i.e., length of primary AC application + number of drum rotations) sent by the DC controller.
The DC controller updates the data each tine the power is turned on, the upper cover is closed, or a print job is over; when the cumulative period of use reaches a specific level, it will identify the condition as indicating the need of replacement of the drum cartridge.

c. Waste Toner
The machine is equipped with a mechanism to find out when the image cartridge becomes full of waste toner. The detection is undertaken by the DC controller by monitoring the output of the waste toner detection mechanism, which consists of a light-emitting member (LED) and a light-receiving member (PD) as well as a PCB.
The DC controller causes the LED to emit light using the LED drive signal (P3.3V); the light from the light-emitting member reaches the cartridge along the light guide mounted to the cartridge. The light them moves through the cartridge, and is detected by the light-receiving member after passing along the light guide; the result is then sent to the DC controller in the form of the waste toner detection signal (WASTONS).
The DC controller checks the level of waste toner with reference to the cumulative period of WASTONS for each single rotation of the stirring plate inside the cartridge when the power is turned on, the upper cover is closed, or a print job is over, and will assume that the cartridge is full of waste toner if it finds that the level has reached a specific value.



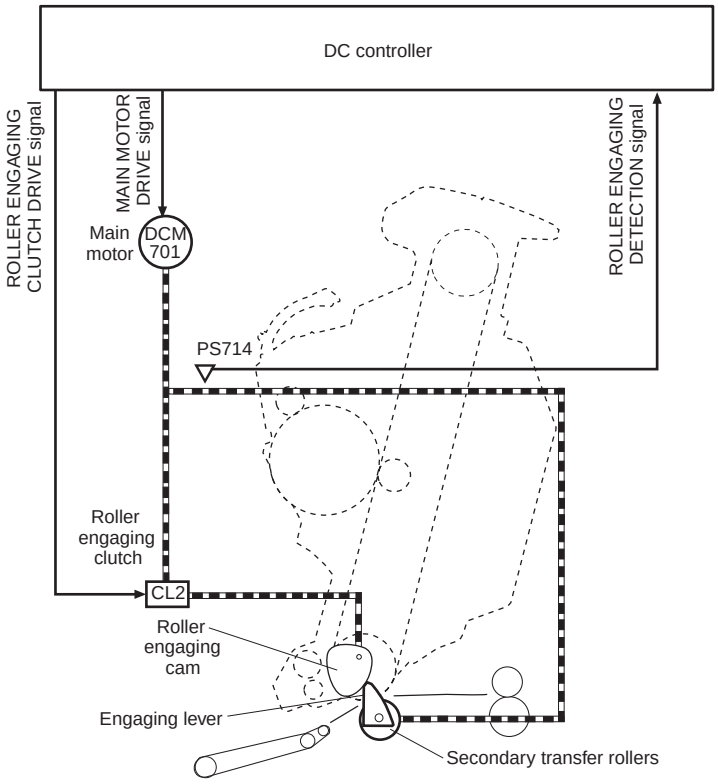
F-2-38

2.4.7 Secondary Transfer Mechanism

2.4.7.1 Outline

0005-8773

The transfer unit has a function of secondarily transferring the toner transferred primarily on the ITB onto paper.
The unit is structured with the secondary transfer roller and engaging lever, which are operated by the main motor drive.
The secondary transfer roller rotates by the motor drive. The engaging lever performs an engaging operation between the secondary transfer roller and ITB in roller engaging control.



F-2-39

2.4.7.2 Secondary transfer roller engaging control

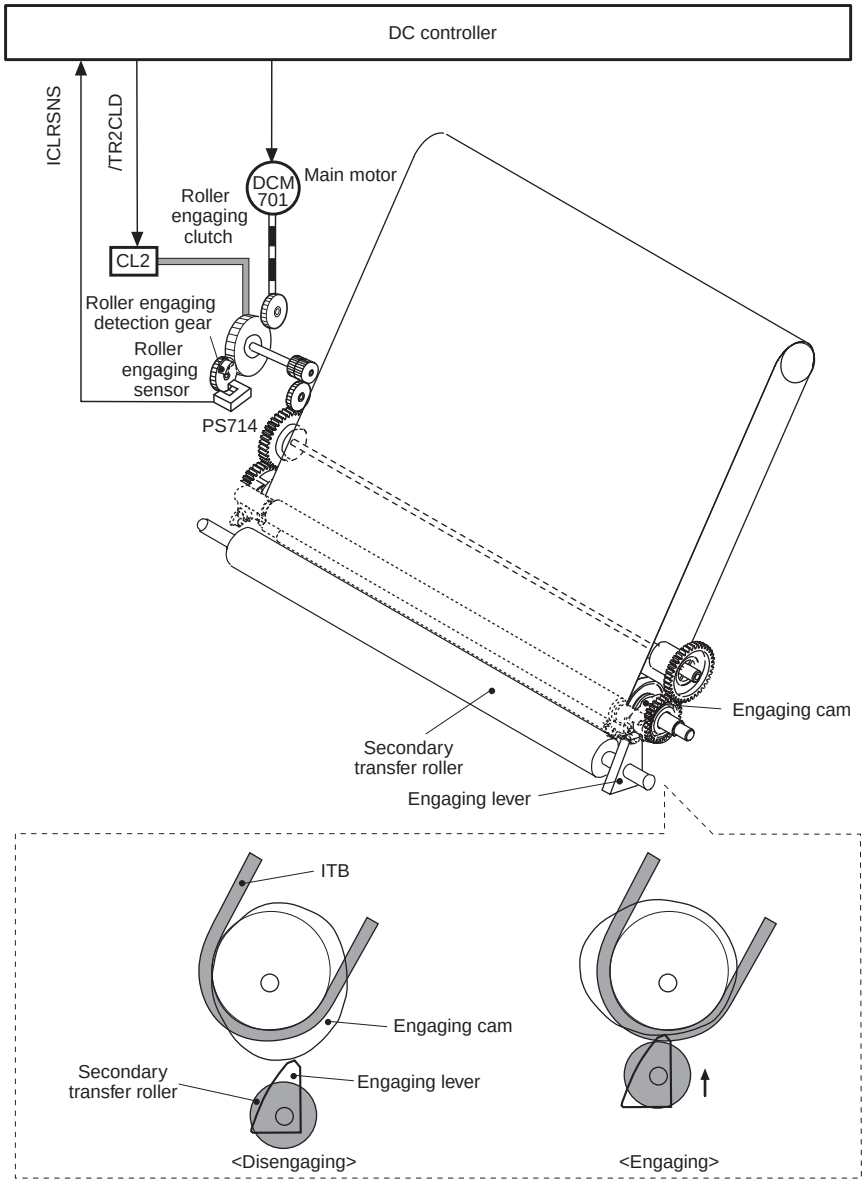
0005-8775

This control is utilized to perform an engaging/disengaging operation between the secondary transfer roller and ITB in order to transfer the toner on the ITB to paper.

The operations of this control are described in the following:

1) At printing, the DC controller checks that the secondary transfer roller is at its home position (Note:1) in secondary transfer roller home position detection.
2) At the timing of the start of secondary transfer, the DC controller let in the roller engaging clutch (CL2). This transmits the drive of the main motor (DCM701) to the engaging cam. Then the engaging lever is pushed out and the secondary transfer roller starts to engage to the ITB.
3) At this point, the DC controller is monitoring the output of the PS714, When the output becomes "L", it lets out the CL2. This allows the cam to stop and the secondary transfer roller to stop at its engaging position.
4) After a print operation, the DC controller lets in the CL2 again for 0.2 seconds. This disengages the secondary transfer roller from the ITB.
5) The DC controller monitors the output of the PS714, When the output becomes "L", it lets out the CL2. This allows the cam to stop and the secondary transfer roller to stop at its home position.

Note 1. The home position for the secondary transfer roller is the state in which it is disengaged from the ITB.
Note 2. The operation of the engaging cam used in this control is also used in the cleaning roller engaging control.



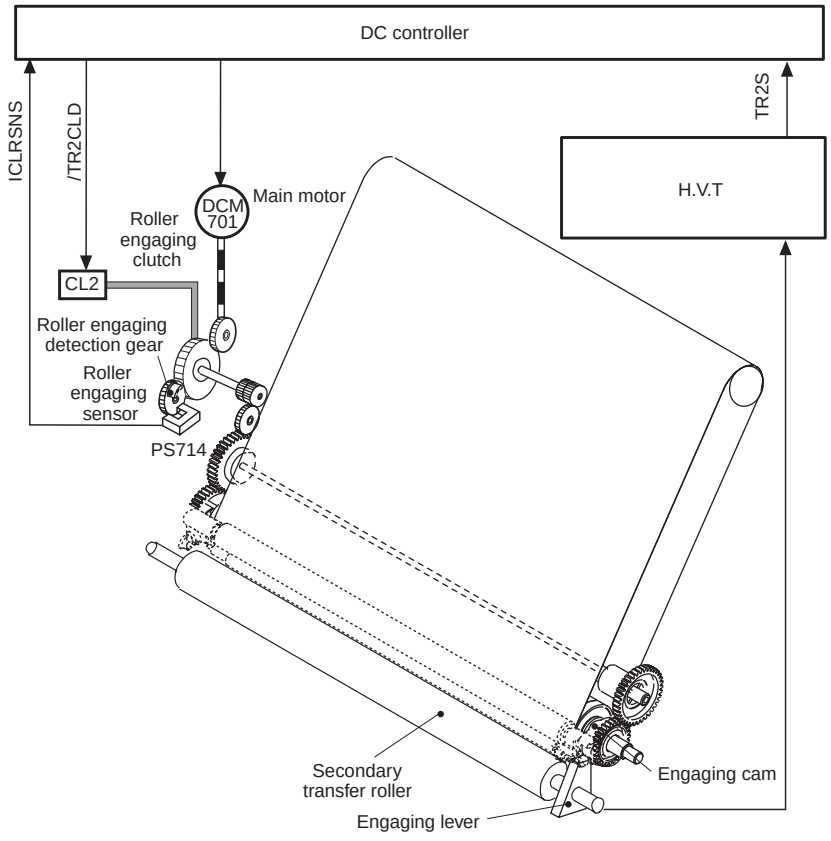
F-2-40

2.4.7.3 Secondary roller position detection

0005-8779

This printer has a function of detecting the engaging position of the secondary transfer roller between the roller and ITB.
The home position of the roller is detected by the DC controller monitoring the roller engaging sensor (PS714) and FEEDBACK (TR2S) signal for the secondary bias.
The DC controller detects whether the roller is at its home position (Note) when the power is turned on or the top cover is closed. This detection is performed by a flag located at the end of the engaging detection gear interrupting the PS714. When the roller is at its home position, the PS714 outputs "L".
When the engaging detection gear is not at its home position; the PS714 is "H", the DC controller rotates the main motor and let in the roller engaging clutch (CL2) for a specified period to return the gear to its home position.
Then the DC controller detects the position of the secondary transfer roller, engaging and disengaging, by monitoring the FEEDBACK (TR2S) signal for the secondary transfer bias.
When the roller is at its engaging position, the resistance of the roller increases and the value of the TR2S signal decreases since the roller contacts with the ITB. When the roller is at a disengaging position, the resistance decreases and the value increases.
If the value of the TR2S signal does not vary when the CL2 is on, the DC controller stops the printer engine and notifies a secondary transfer roller engaging mechanism abnormality to the interface controller.

⚠ The home position for the secondary transfer roller is the state in which it is disengaged from the ITB.


DC controller
ICLRSNS
/TR2CLD
TR2S
H.V.T
DCM
701
Main motor
Roller
engaging
clutch
CL2
Roller engaging
detection gear
Roller
engaging
sensor
PS714
Secondary
transfer roller
Engaging cam
Engaging lever

F-2-41

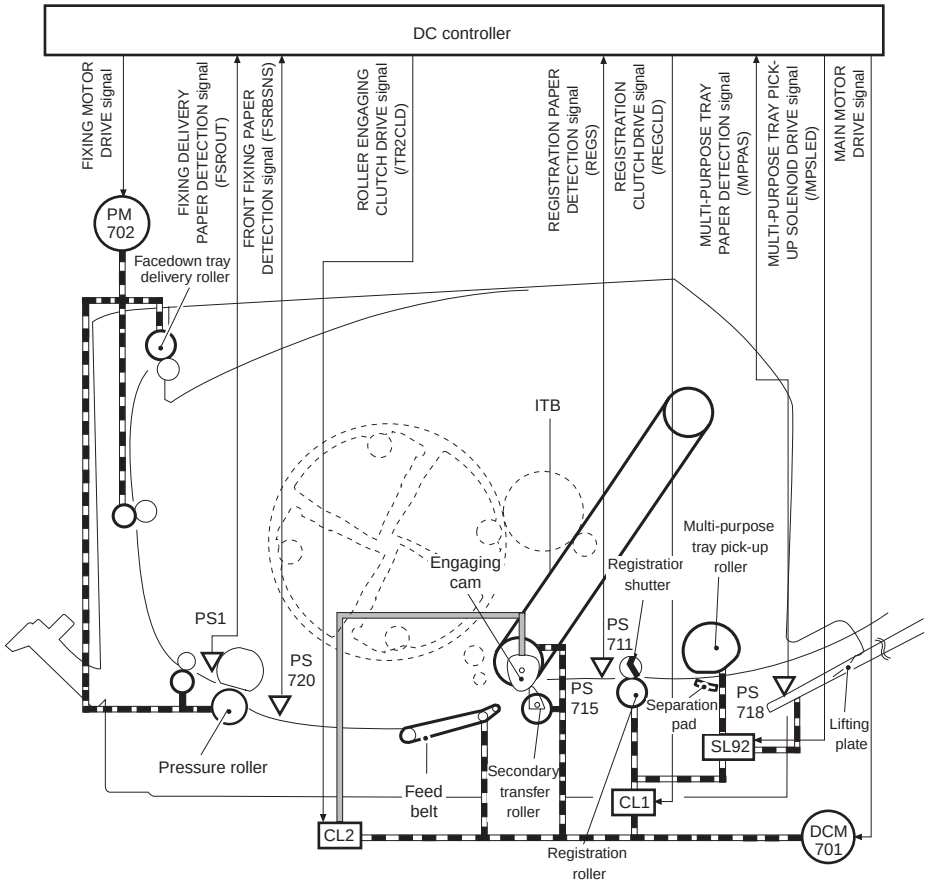
2.5 Pickup/Feeding/Delivery System

2.5.1 Overview/Configuration

2.5.1.1 Outline

0005-8798

The pick-up/feed system, which consists of various kinds of feed rollers, plays a role in paper pick-up and feeding.
This printer utilizes the multi-purpose tray for a pick-up source and the face-up tray and face-down tray for a delivery source.
The presence of paper on the multi-purpose tray is detected with the multi-purpose tray paper sensor (PS718).
The DC controller drives each roller by controlling two motors, two clutches, and one solenoid.
Three photo interrupters (PS1, PS711, PS720) on a paper path detect the reach or passage of paper. If paper does not reach or pass each sensor unit within a specified period, the CPU in the DC controller determines a jam and notifies a jam occurrence to the video controller.
The configuration of the motors, solenoids, and sensors are indicated.



F-2-42

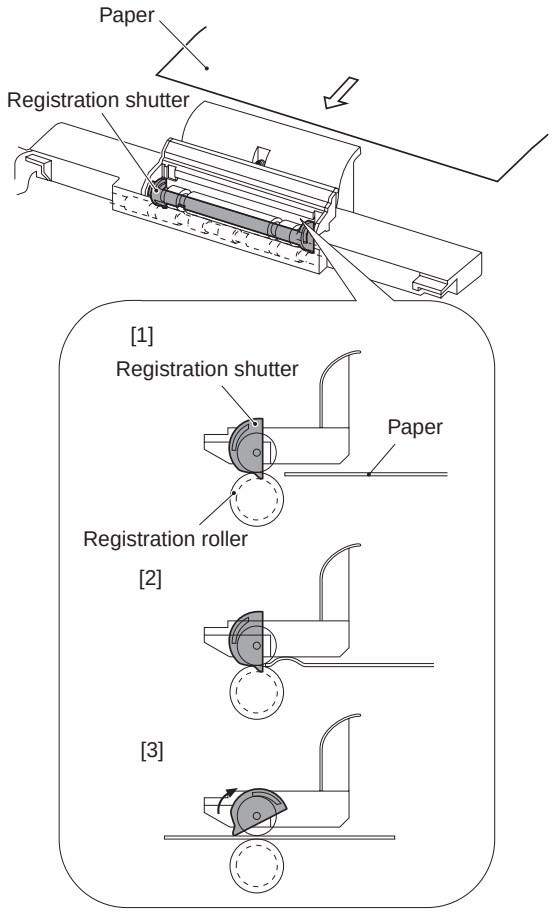
PS1: Fixing delivery paper sensor
PS711: Registration paper sensor
PS718: Multi-purpose tray paper sensor
PS720: Front fixing paper detection sensor
DCM701: Main motor
PM702: Fixing motor
SL92: Multi-purpose tray pick-up solenoid
CL1: Registration clutch
CL2: Roller engaging clutch

2.5.2 Other Control

2.5.2.1 Skew correction function

0005-8815

This function is utilized to correct the skew of the paper to be fed, using the registration shutter method.
The operations of this function are discussed below.
When paper is fed to the registration roller, the leading edge of paper is pushed against the registration shutter to correct a skew (1). Paper is warped as the feed roller keeps pushing it when it is pushed against the shutter (2). The shutter is lifted up by the stiffness of paper as paper warps, and paper passes through the shutter (3). It allows the skew of paper to be corrected.



F-2-43

2.5.2.2 Feed speed control

0005-8818

In this control, a feed speed is changed based on the types of the fed paper in order to prevent fixing defects.
The DC controller changes a feed speed in two levels based on a paper type specification command sent from the video controller.
Types of paper and their feed speeds are indicated below.

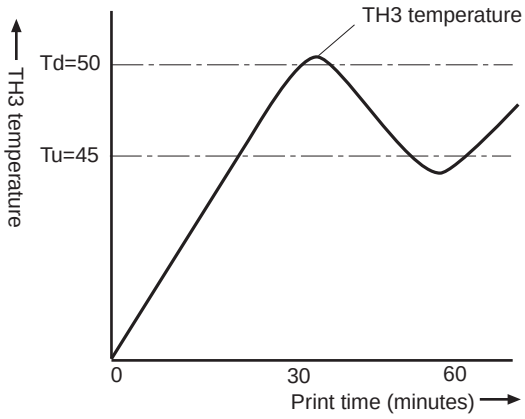
T-2-3

Media type	Print type	Feed speed
Plain paper	Full-color	Normal speed
	Mono-color	
Heavy paper	Full-color	
	Mono-color	
OHP sheet	----------	
	Mono-color	
Thick paper	Full-color	
	Mono-color	
Special paper	Full-color	Half speed
	Mono-color	
Envelope	Full-color	
	Mono-color	
Label	Full-color	
	Mono-color	

2.5.2.3 Internal temperature detection

0005-8819

This printer utilizes a function of detecting the internal temperature in order to prevent a temperature rise in it. The internal temperature detection thermistor (TH3) is provided for this function.
If the DC controller detects that the internal temperature exceeds the temperature ceiling (Td) by the TH3 in continuous printing, it widens a space between sheets to prevent an internal temperature rise.
If the temperature goes below the temperature floor (Tu), the DC controller returns the space between sheets to normal.



F-2-44

2.5.3 Detecting Jams

2.5.3.1 Jam Detection Outline

2.5.3.1.1 Outline

0005-8829

To detect the presence of paper and whether paper has been correctly fed, the following paper sensors are provided:
- Registration sensor (PS711)
- Fixing delivery paper sensor (PS1)
- Fixing front paper sensor (PS720)

The CPU in the DC controller determines whether a paper jam has occurred by checking for the presence of paper at the sensor unit at the timing stored in the CPU. If the CPU determines a jam, it stops a print operation and notifies the jam occurrence to the video controller.
Occurrence timings for each jam are listed below. A specified period is timed at a normal speed (1/1-speed).

2.5.3.2 Delay Jams

2.5.3.2.1 Pick-up delay jam

0005-8831

When the leading edge of paper does not reach the registration sensor (PS711) within a specified period (t) after the start of a pick-up operation, the CPU determines a pick-up delay jam.
t = Approx. 1.1 seconds.

2.5.3.2.2 Delivery delay jam

0005-8838

When the leading edge of paper does not reach the fixing delivery paper sensor (PS1) within a specified period (t) after the start of a re-pick-up operation (the registration clutch is on), the CPU determines a delivery delay jam.
t = Approx. 2.3 seconds.

2.5.3.3 Stationary Jams

2.5.3.3.1 Pick-up stationary jam

0005-8834

When the trailing edge of paper does not pass the registration sensor (PS711) within a specified period (t) after the start of a re-pick-up operation (the registration clutch is on), the CPU determines a pick-up stationary jam.
t = Approx. 3.4 seconds.

2.5.3.3.2 Delivery stationary jam

0005-8839

When the leading edge of paper does not pass the fixing delivery paper sensor (PS1) within a specified period (t) after it has passed the registration sensor (PS711), the CPU determines a delivery stationary jam.
t = Approx. 2.4 seconds.

2.5.3.4 Other Jams

2.5.3.4.1 Fixing unit wrapping jam

0005-8835

CPU detects fixing unit wrapping jam, when there are any print papers inside the fixing front paper sensor when turning on the power or after closing the upper cover.

2.5.3.4.2 Door open jam

0005-8840

When the top cover is opened during a print operation, the main CPU determines a door open jam.

2.5.3.4.3 Residual paper jam

0005-8842

The CPU determines a residual paper jam under the following conditions:
- Power is turned on.
- Returned from the sleep status.
- Door is closed after a jam occurrence.
- Registration sensor (PS711) and fixing delivery sensor (PS1) detect paper.

2.5.4 Multi-purpose Pickup

2.5.4.1 Multi-purpose tray pick-up

0005-8808

When printing from the multi-purpose tray, paper on it is fed into the printer one by one.
The following describes the multi-purpose tray pick-up operation:
1) When a print command is input from the video controller, the DC controller drives the main motor (DCM701) to rotate the ITB.
2) Within a specified period after the start of the DCM701 rotation, the multi-purpose tray pick-up solenoid (SL92) goes on.
3) After a lifting plate for the multi-purpose tray has moved up, the multi-purpose tray pick-up roller starts to rotate. This allows paper on the tray to be fed into the printer.
4) After a multiple-fed paper is removed with the separation pad, paper is sent to the registration roller.
5) After the skew of paper is corrected with the registration shutter, a feed speed is changed based on a paper type specified from the video controller in feed speed control.
6) Then, the DC controller let in the registration clutch (CL1) within a specified period in ITB home position detection function. This allows the drive of the DCM701 to transmit to the registration roller and paper to be fed to the secondary transfer roller.
7) The DC controller press the secondary transfer roller against the ITB in secondary transfer roller engaging control. Simultaneously, it lets in the roller-engaging clutch (CL2). This allows the drive of the DCM701 to transmit to the secondary transfer roller. Toner is transferred onto paper on the ITB and paper is fed to the fixing/delivery unit.

2.6 FIXING UNIT SYSTEM

2.6.1 Overview/Configuration

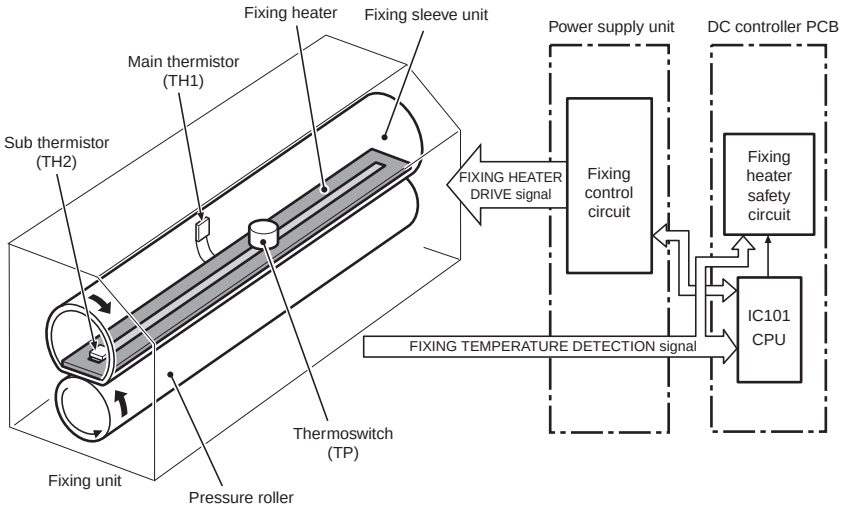
2.6.1.1 Outline

0007-9301

This printer utilizes an on-demand fixing method which is configured as shown in the figure below.

T-2-4

- Heater:	
	One heater is utilized in the fixing unit. Fixing heater (H1): For fixing film heating (ceramic heater)
- Thermistors:	
	Two thermistors are utilized in the fixing unit. Main thermistor (TH1): For fixing heater temperature control (contact thermistor) Sub thermistor (TH2): For fixing heater temperature rise detection at its end (contact thermistor)
- Thermoswitch:	
	One thermoswitch is placed on top of the fixing heater (non contact type). When the fixing heater is abnormally overheated, the switch opens and cut off the power supply to the heater.



F-2-45

This control circuit has the following four controls and functions:
- Heater temperature control-Maintains the fixing heater at a specified temperature.
- Flicker prevention function-Prevents flicker caused by attaching lighting apparatuses to the power source to which the printer is connected.
- Protective function-Shuts off the power supply to the fixing heater when the heater is overheating.
- Failure detection-Monitors the abnormalities of the fixing unit and when an abnormality occurs, shuts off the heater and notifies it to the video controller.

The controls and functions in the fixing control circuit are described next.

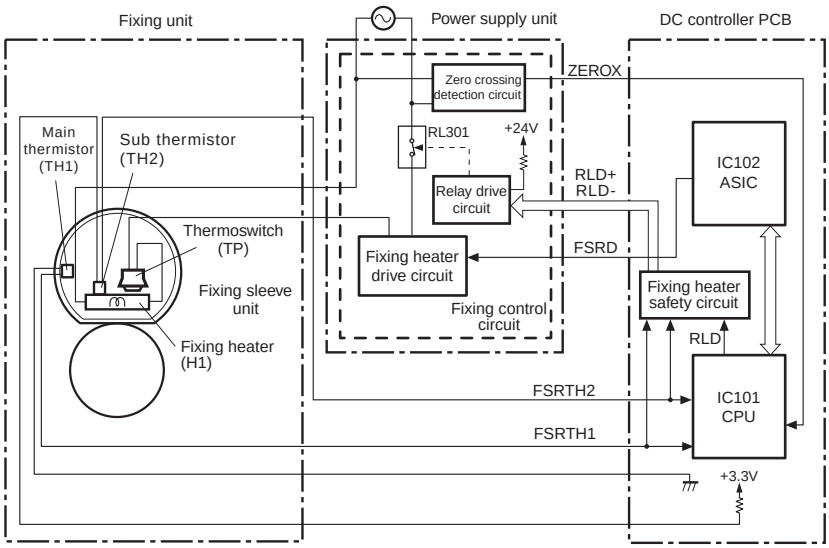
2.6.2 Various Control Mechanisms

2.6.2.1 Fixing Temperature Control

2.6.2.1.1 Heater temperature control

0007-9310

This function detects an abnormal temperature rise of the heater and shuts the heater off.
This printer utilizes three protective functions performed by the following parts, to prevent an abnormal temperature rise of the heater:



F-2-46

The fixing heater temperature is monitored by two thermistors: the main thermistor (TH1) and the sub thermistor (TH2).
The TH1 is to control the print temperature and between-sheets temperature. It is placed contacting inside surface of the fixing sleeve and monitors the sleeve temperature. The TH2 is to control the start-up temperature. It is in contact with the fixing heater and detects the temperature rise at the end. As the surface temperature of the fixing heater rises, the resistances of both thermistors reduce and the voltage of the FIXING HEATER TEMPERATURE DETECTION signals (FSRTH1, FSRTH2) varies in analog form.
The CPU (IC101) in the DC controller monitors the voltage of these two signals (FSRTH1,FSRTH2) and accordingly outputs the FIXING HEATER DRIVE signal (FSRD). Based on this signal the fixing heater drive circuit controls and maintains the fixing heater at the specified temperature.
This control system is divided into the following five fixing sequences.

1) Start-up temperature control

This control is to determine the start-up temperature of the fixing heater according to its temperature (detected by TH2) upon energization. If the heater is energized within 30 seconds after a print is completed, the start-up temperature is determined according to the last printing temperature.
The fixing heater on for a specified time before it drives the feed motor if the heater temperature is below 55 deg C at the start of fixing heater drive (detected by TH2). It drives the motor after the fixing heater is left on for the prescribed time period.

2) Print temperature control

This control is to maintain the fixing heater at the target temperature during printing. The CPU raises the target temperature in stages in one printing process to prevent the temperature fall of the fixing sleeve as the paper goes through. The target temperature varies in stages depending on the number of print if continuous printing and it differs depending on the color of print(monochrome or colors) and the media type.

3) Between-sheets temperature control

This control is to make the temperature of the fixing heater lower than the target temperature during continuous printing to prevent the temperature rise of the fixing sleeve between sheets.
The between-sheets temperature varies depending on the distance between two sheets and media type.

4) Throughput control

This control is to prevent the overheating at both ends of fixing sleeve unit during continuous printing of a narrow paper. For a continuous printing, this CPU decreases the throughput by extending the paper pick-up intervals if the sub thermistor reads over 270 deg C and the paper width is narrower than 210mm, or the sub thermister reads over 280 deg C independent of the paper width.

2.6.3 Protective Functions

2.6.3.1 Flicker prevention function

0007-9336

This function is utilized to prevent flicker caused by attaching lighting apparatuses to the ACÅ@power source to which the printer is connected.
The heater drive circuit uses a triac to switch AC power. If the user connects lighting apparatuses to the power supply, to which the power connector is connected, the current flowing into theÅ@heater increases. This decreases the voltage level of the AC line and results in flicker.
To prevent flicker, the printer utilizes a zero cross circuit that monitors the AC line voltage. The CPU detects ZERO CROSS DETECTION (ZEROX) signal to optimize the timing to energize the heater.

2.6.3.2 Protective function

0007-9312

This function detects an abnormal temperature rise of the heater and shuts the heater off.
This printer utilizes three protective functions performed by the following parts, to prevent an abnormal temperature rise of the heater:
1) CPU
2) Fixing heater safety circuit
3) Thermoswitch

Each protective function will be discussed in the following:

1) Protective function by the CPU

The CPU monitors the output voltages (FSRTH1, FSRTH2) of the main/sub thermistors. If the FSRTH1 is approx. 0.77 V or less (equivalent to 245 deg C or higher), or the FSRTH2 is approx 2.9 V or higher (equivalent to 290 deg C or higher), the CPU determines a fixing unit failure and executes the following:
1. Sets the FIXING HEATER DRIVE (FSRD) signal "L" through the ASIC and shuts off the heater.

2. Sets the RELAY DRIVE (RLD) signal "L" through the ASIC.
3. Sets the RELAY DRIVE (RLD-) signal "L" through the fixing heater safety circuit.
4. Turns off the relay (RL301) through the relay drive circuit and shuts off the heater.

2) Protective function by the fixing heater safety circuit

This circuit monitors the output voltages (FSRTH1, FSRTH2) of the main/sub thermistors.
When the FSRTH1 is approx. 0.5 V or less (equivalent to 280 deg C or higher), or the FSRTH2 is approx 3.0 V or higher (equivalent to 315 deg C or higher), the relay (RL301) is turned off and the heater is shut off.

3) Protective function by the thermoswitch

The thermoswitch (TP) gets disconnected to interrupt the current to the fixing heater when it reads the temperature of over 250 deg C (Note) due to an abnormal temperature rise of the fixing heater.

⚠
The thermoswitch is placed away from the fixing heater. The actual temperature of the fixing heater is higher than the thermoswitch reading.

2.6.3.3 Fixing unit failure detection

0007-9315

The CPU determines fixing unit failures under the following conditions 1) - 3), turns off the relay (RL301), shuts off the heater, simultaneously notifies the failure to the video controller:

1) Abnormal high temperature

* Abnormal high temperature on the main thermistor
If the main thermistor continuously reads 245 deg C or higher for minimum 1 second, the CPU judges it abnormally high.

* Abnormal high temperature on the sub thermistor
If the sub thermistor continuously reads 290 deg C or higher for minimum 1.5 seconds, the CPU judges it abnormally high.

2) Abnormal low temperature

* Low temperature during temperature control
If the main thermistor continuously detects below 100 deg C for minimum 1 second during the print temperature control and between-sheets temperature control, the CPU judges it abnormal.

* Abnormal low temperature on the sub thermistor
If the sub thermistor continuously reads below 75 deg C for minimum 2 seconds after 20 seconds from when the heater is energized, the CPU judges it abnormal.

* Break during start-up in the sub thermistor
If the sub thermistor continuously reads below 40 deg C for minimum 1 second after the heater is energized, the CPU judges that the sub thermistor has a break.

* Break in the main thermistor
If the main thermistor continuously reads below 40 deg C for minimum 0.5 second after the start-up temperature control, the CPU judges that the main thermistor has a break.

* Break in the sub thermistor
If the sub thermistor continuously reads below 40 deg C for minimum 0.5 second after the start-up temperature control, the CPU judges that the sub thermistor has a break.

3) Start-up abnormality

* Start-up abnormality 1
If the main thermistor continuously reads below 120 deg C for minimum 1 second after 20 seconds from when the heater is energized, the CPU judges it abnormal.

* Start-up abnormality 2
If the main thermistor reading never exceeds 5 deg C below the target temperature of temperature control within 75 seconds from when the heater is energized, the CPU judges it abnormal.

2.7 EXTERNAL AND CONTROLS SYSTEM

2.7.1 Power Supply

2.7.1.1 Power Supply

2.7.1.1.1 Low-voltage power supply PCB

0007-6735

This circuit converts AC voltage input from the power supply receptacle to DC power and supplies it to each load.
The AC power is supplied to the low-voltage power supply circuit by turning on the power switch (SW1).
The supplied AC power is converted to the DC power required in the printer: +24 V, +5 V, and +3.3 V. +24 V is supplied to drive loads such as the motors, solenoids, clutches, etc. and to the high-voltage power supply circuit. +5 V is supplied to the laser driver circuit, BD circuit, and video controller. +3.3 V is supplied to the video controller, sensors, etc., and the ICs, etc. in the DC controller.
+24 V can be divided into +24 VA and +24 VB. +24 VB is supplied from the low-voltage power supply PCB to the motors and optional units constantly. +24 VA is supplied to the high-voltage power supply circuit, developing rotary motor, toner cartridge motor, solenoids/ clutches, etc. through the door open detection switch (SW2). It stops power supply when the door switch is turned off by opening the top cover. It also functions as the DOOR OPEN DETECTION (/DOORS) signal and the CPU detects a door open with this signal.

2.7.1.2 Other Function

2.7.1.2.1 Protective function

0005-8800

The low-voltage power supply circuit utilizes overcurrent/overvoltage protective functions. They automatically shut off an output voltage to prevent a power supply circuit failure due to excessive current flow caused by a short-circuit on the load side or abnormal voltage generation.
When the DC voltage is not output from the low-voltage power supply circuit, the overcurrent/overvoltage protective function may be activated. If it is activated, turn off the power switch (SW1) and rectify problems on the load side. Turn back on the switch. Be sure not to do so within 3 minutes after turning it off.
The circuit contains two power fuses (FU1, FU2), which break and shut off the power if overcurrent flows through the AC line.

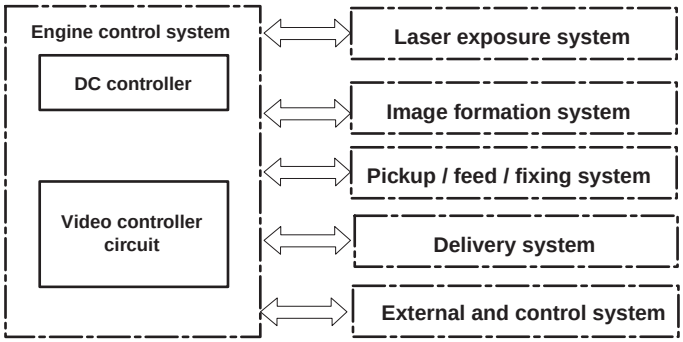
2.8 ENGINE CONTROL SYSTEM

2.8.1 Construction

2.8.1.1 Outline

0005-8702

The engine control system is the brain of the printer, which controls the laser exposure system, image formation system,pick-up/feed/delivery system and external and control system.
This system consists of the DC controller, video controller.
The block diagram of the engine control system is illustrated in the figure below. Each circuit is described in the following.



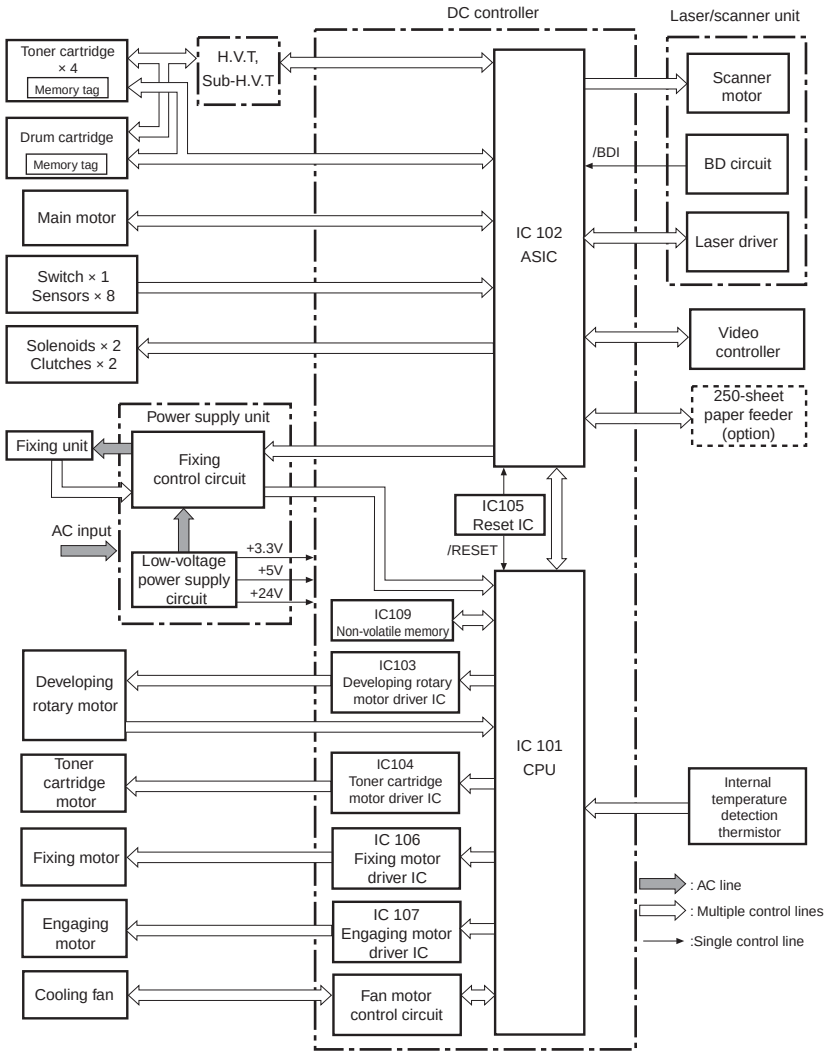
F-2-47

2.8.2 DC Controller

2.8.2.1 Outline

0005-8708

The DC controller, which is controlled by the CPU in it, controls operation sequences for the printer.
When the power is turned on and DC power is supplied from the power supply unit to the DC controller PCB, the CPU starts to control the operations of the printer. Then, when the printer enters the standby status, the CPU drives loads such as the laser diodes, motors, solenoids, etc. based on a print command and image data input from the video controller.



F-2-48

2.8.2.2 Operations

0005-8711

a. CPU (IC101)
A 16-bit single-chip microcomputer is used for a CPU. It has a built-in ROM and RAM. It controls the following operations according to a program stored in the ROM:
1) Printer engine sequence control
2) Drive controls for the developing rotary motor, toner cartridge motor, fixing motor, engaging motor
3) Drive control for the cooling fan
4) Internal temperature detection thermistor control
5) Reading/writing to the non-volatile memory
b. ASIC (IC102)
The ASIC (Application Specific IC) is an IC used for interface of IC, memory, external device, etc. It controls the following operations according to the CPU:
1) Laser/scanner control
2) Control of communications with the video controller
3) Power supply unit (fixing control circuit, low-voltage power supply circuit) control
4) High-voltage power supply PCB control
5) Drive control for the main motor
6) Sensor/switch controls
7) Clutch/solenoid controls
8) Reading/writing to the memory tag
9) 250-sheet paper feeder (option) control
c. Reset IC (IC105)
It monitors +3.3 V and resets the CPU and ASIC when the power is turned on.

d. Non-volatile memory (IC109)
It stores backup data.

e. Developing rotary motor driver IC (IC103)
It controls the developing rotary motor.
f. Toner cartridge motor driver IC (IC104)

It controls the toner cartridge motor.

g. Fixing motor driver IC (IC106)
It controls the fixing motor.

h. Engaging motor driver IC (IC107)
It controls the engaging motor.

i. Fan motor control circuit
It controls the cooling fan motor.

2.8.2.3 Motor/fan control

0007-9343

This printer utilizes four DC motors and two stepping motors.
One of the three DC motors is used for image formation, the second one, for image formation and paper feed, and the third one, as a fan motor to avoid a temperature rise in the printer. Two of the three stepping motors are used for image formation, and the other, for paper feed. Since the printer transfers toner in four colors onto the same areas on the ITB, subtle changes in motor speed may result in color misregistration. The DC motors used for image formation are controlled high-precisely for rev fluctuations caused by loads.
The specifications of motors used in this printer are listed.

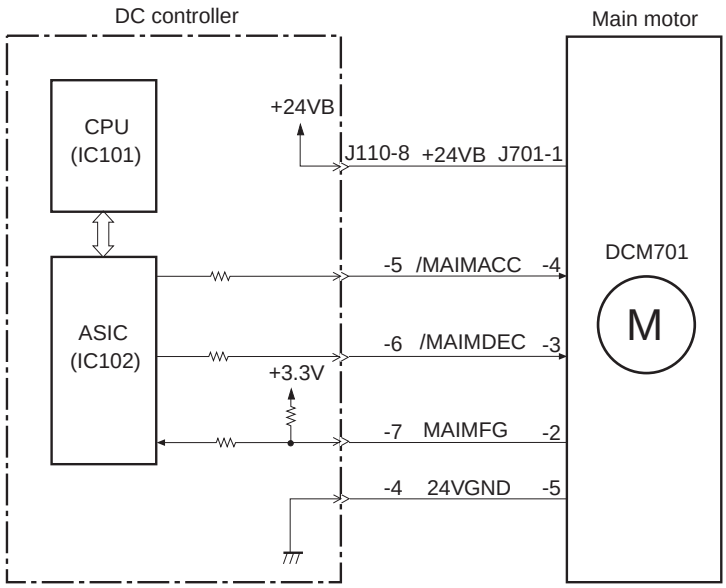
T-2-5

Name	Purpose	Type	Rotational direction	Speed	Failure detection
Main motor (DCM701)	Drives the multi-purpose tray pick-up roller, registration roller, photosensitive drum, secondary transfer roller, ITB, feed belt, and waste toner screws; and moves the lifting plate up and down.	DC motor	CW	3-speed (full, 1/2,1/4)	Yes
Developing rotary motor (DCM703)	Drives the developing rotary.	DC motor	CW	1-speed	Yes
Fixing motor (DCM702)	Drives the pressure roller and facedown tray delivery roller.	DC motor	CW	3-speed (full, 1/2,1/4)	Yes
Engaging motor (PM704)	Engages the photo-sensitive drum and developing cylinder, and the memory tag contacts on the toner cartridge side and printer side.	Stepping motor	CW/CCW	1-speed	No
Toner cartridge motor (PM705)	Drives the developing cylinder and toner stirrer.	Stepping motor	CW	1-speed	No
Cooling fan (FM721)	Intakes air to cool down around the fixing unit, low-voltage power supply, high-voltage power supply, and cartridge.	DC motor	-	1-speed	Yes

2.8.2.4 Main motor control

0005-8720

This control is utilized to drive the main motor (DCM701).
The DCM701, a three-phase, eight-pole DC motor with a built-in drive circuit, drives each roller used for paper feed and image formation.
The DC controller drives the motor by controlling the MAIN MOTOR ACCELERATION (/MAIMACC) signal and MAIN MOTOR DECELERATION (/MAIMDEC) signal.
The illustration below shows the control circuit of the motor.



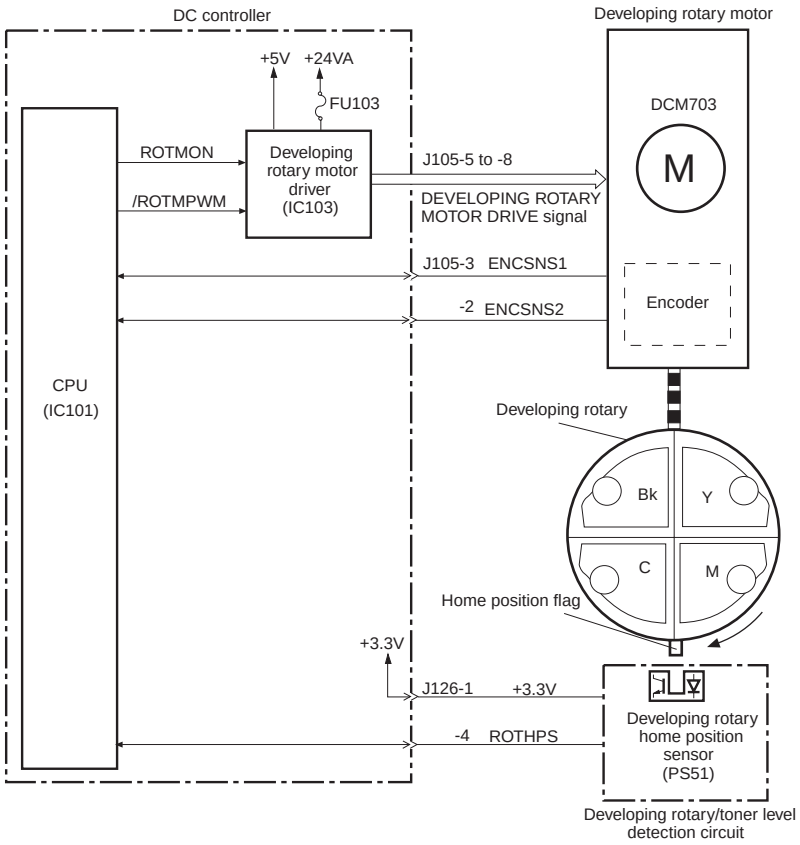
F-2-49

The operations of the main motor are discussed next.
The CPU in the DC controller rotates the motor by setting the /MAIMACC signal "L" through the ASIC.
The CPU monitors the MAIN MOTOR SPEED DETECTION (MAIMFG) signal. The CPU out-puts the /MAIMACC signal when the motor does not reach specified revs, and outputs the/MAIMDEC signal when it exceeds a specified rev. Then, the CPU controls these signals to adjust the motor revs to a specified value.
The CPU determines a main motor failure, then stops the printer, and notifies the failure to the video controller, under the following conditions:
1) The period of the MAIMFG signal does not satisfy a specified period within 100 ms after the start of main motor drive.
2) The period of the MAIMFG signal goes out of a specified period continuously for more than 1 seconds after it once reaches the value.

2.8.2.5 Developing rotary motor control

0005-8722

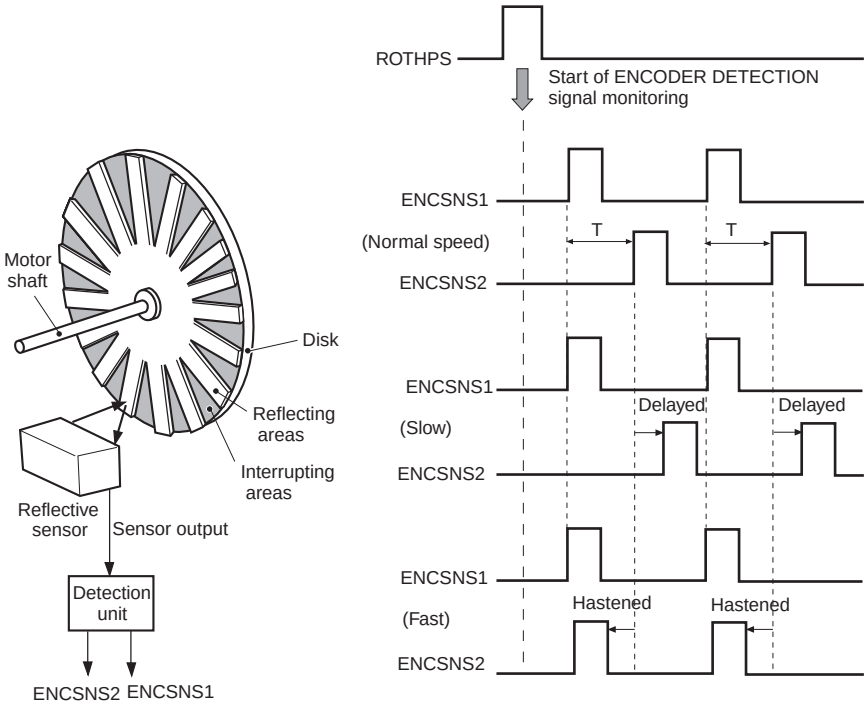
This control is utilized to drive the developing rotary motor (DCM703).
The DCM703, a three-phase, eight-pole DC motor with a built-in encoder, drives the developing rotary.
The DC controller drives the motor by controlling the DEVELOPING ROTARY MOTOR ON (ROTMON) signal and DEVELOPING ROTARY SPEED CONTROL (/ROTMPWM) signal.
The illustration below shows the control circuit of the motor.



F-2-50

The operations of the developing rotary motor are discussed next.
The CPU in the DC controller outputs the two signals (ROTMON, /ROTMPWM) to the developing rotary motor driver (IC103) after receiving a print command. The IC103 rotates the DCM703 by outputting the MOTOR DRIVE signal to the DCM703 based on the two signals. In parallel with it, the CPU monitors the DEVELOPING ROTARY HOME POSITION DETECTION (ROTHPS) signal.
There is a home position flag located on the developing rotary. It interrupts the sensor (PS51) as the rotary rotates. This allows the ROTHPS signal to output "L".
The CPU monitors the two ENCODER DETECTION (ENCSNS1, ENCSNS2) signals output from the encoder (Note) of the DCM703 when the output of the ROTHPS becomes "H". It detects motor speed from a time difference between the ENCSNS1 and ENCSNS2 signals. It controls the output of the /ROTMPWM signal to adjust the revs of the DCM703 to a specified value.
The CPU determines a developing rotary motor failure, then stops the printer engine, and notifies the failure to the video controller, under the following conditions:
1) When the CPU cannot detect ENCODER DETECTION signal within 5 seconds after the start of the developing rotary motor drive.
2) When the pulse count for ENCODER DETECTION signal does not fit in the prescribed range, (within -/+ 200 of a targeted pulse count memorized by CPU)after a period of time from the start of the drive when the developing rotary motor becomes Ready.

⚠ The encoder used in this printer consists of a disk, reflective sensor, and detection unit. The disk is installed on the motor shaft. The disk rotates as the motor does. The disk has reflective areas and interrupting areas alternately located on its surface. The sensor strikes light to the rotating disk and sends the monitoring results of the reflected light to the detection unit. The detection unit monitors the results constantly. It generates the two ENCODER DETECTION (ENCSNS1, ENCSNS2) signals based on the tim-ing of detecting the reflective and interrupting areas on the disk and sends the signals to the DC controller.

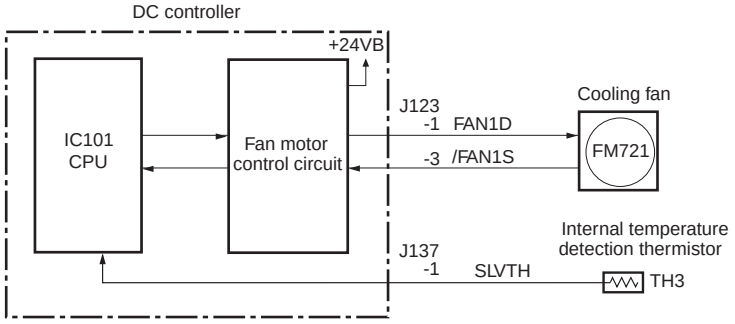


F-2-51

2.8.2.6 Cooling fan

0005-8726

The Cooling fan, a DC brushless motor with a built-in Hall device, cools off around the fixing unit, power supply unit, high-voltage power supply PCB, and cartridge.
The CPU (IC101) controls the cooling fan.
The CPU outputs the FAN DRIVE (FAN1D) signal after receiving a print command from the interface controller and rotates the cooling fan. After the completion of a print operation, the CPU rotates the fan for a specified period based on internal temperature by monitoring the internal temperature detection thermistor (TH3). Then it stops the fan.(Refer to the table below)
The CPU monitors the FAN LOCK DETECTION (/FAN1S) signal while the cooling fan is rotating. If the signal remains "H" continuously for more than 10 seconds, the CPU determines a fan failure, then stops the printer, and notifies the failure to the video controller.



F-2-52

T-2-6

Thermistor detection temparature (deg C)	Fan rotation time (s)
44 or less	0
45 to 49	30
50 or more	300

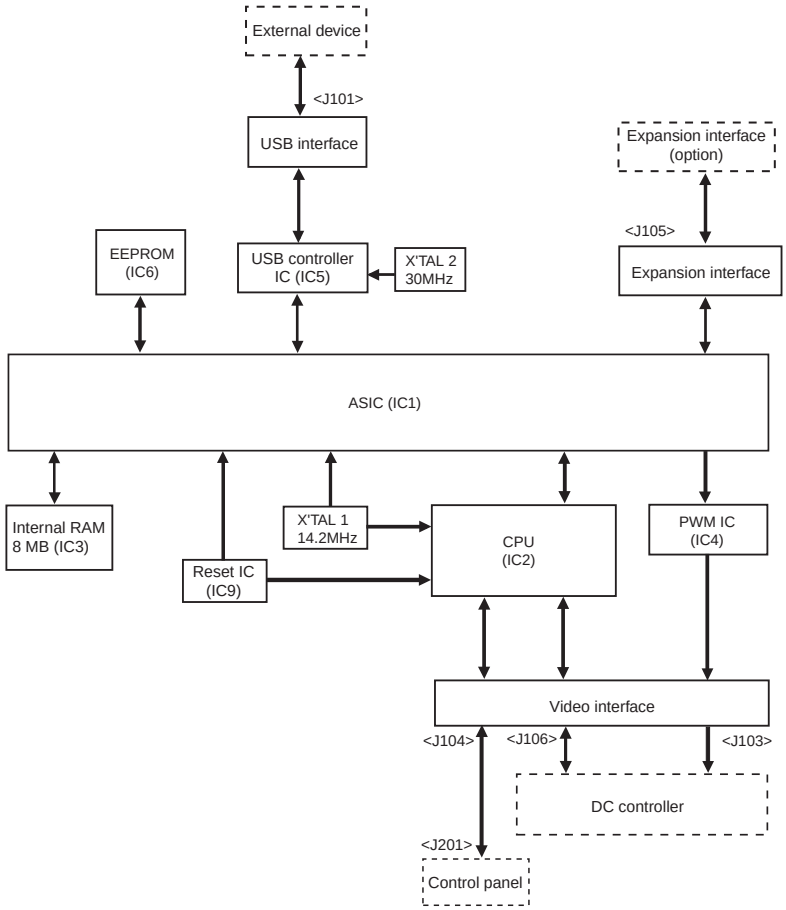
2.8.3 Interface Controller

2.8.3.1 Outline

0005-8811

The video controller serves to receive print information from an external device (e.g., host computer) over an interface cable.
Such print information may be either CAPT commands used to communicate the status of the printer and printer-specific information or dot-matrix data

resulting from conversion by the host computer of print data of a resource type.
Dot-matrix data is sent to the DC controller PCB, and is used to control the activation of the laser diode.
The bi-directional interface enables an external device to monitor the status of the printer.

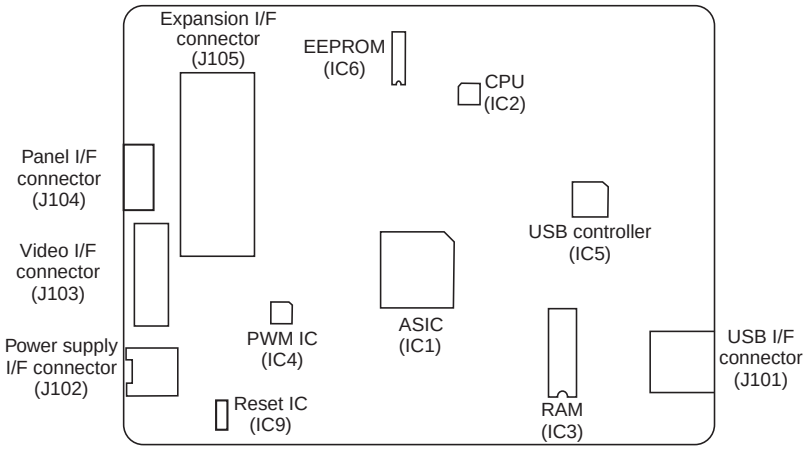


F-2-53

2.8.3.2 Operation of the Blocks

0005-8814

a. ASIC (IC1)
It has the following primary functions:
1) controls the input to and output from the internal RAM.
2) controls the timing at which dot pattern data is sent to the printer.
3) decompresses compressed image data.
b. CPU (IC2)
It has the following primary functions:
1) processes the serial commands of the video interface.
2) sends and receives CAPT commands through the USB interface.
3) controls the control panel interface.
c. RAM (IC3)
The RAM possesses 8 MB of memory for storage of the following contents:
1) It stores dot matrix data converted from image data (reception buffer)
d. PWM IC (IC4)
It puts image data from ASIC through pulse width modulation for conversion.
e. USB Controller IC (IC5)
It controls the USB interface.
f. EEPROM (IC6)
It is a 64K-bit memory capable of deleting data or writing new data electrically, and is used for storage of the printer's permanent parameters (e.g., printing environment), which are retained even after the power has been turned off.
g. Reset IC (IC9)
IC105 monitors +3.3 V and resets the CPU and ASIC when the power is turned on.



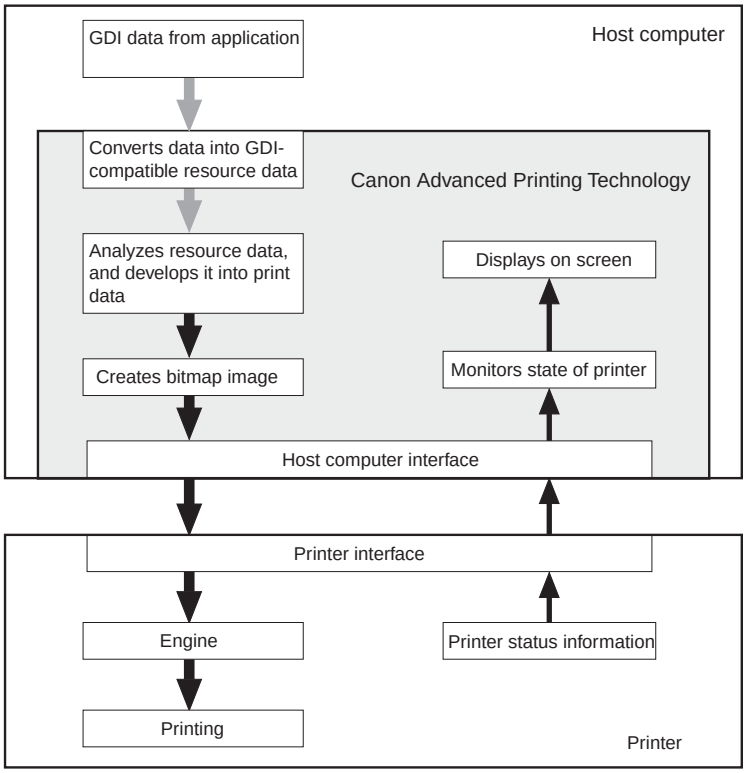
F-2-54

2.8.3.3 Canon Advanced Printing TechnologyÅ@(CAPT)

0007-6028

The term Canon Advanced Printing Technology hereafter (CAPT) refers to a system of processing data in which printing speed is reduced and operation is made easier for more user-friendly printing in a Microsoft Windows environment. In CAPT, the following takes place so as to generate output as fast and as easily as possible:

- Instead of converting the print data coming from the application into the printer's page description language (PDL), it turns it into resource data which is GDI-compatible.
- It turns the resulting GDI-compatible source data into dot matrix data on the host computer and sends the result to the host computer.
- It allows making selections to set up a printing environment using dialog boxes on the host computer.



F-2-55

- It indicates the status of the printer on the screen of the host computer, enabling a check on the end of printing, feed of print paper, and error status using the host computer screen.

⚠ Graphics Device Interface (GDI)
It is a graphics drawing system of processing data that prints or displays images in a Windows environment (or an interface of a graphics system used in conjunction with an application).

CAPT is sued after installing it to a Microsoft Windows 2000/XP or 98/Me environment. Use the CD-ROM that comes with the machine for installation.

In CAPT, the paper size, original size, number of prints to make, and settings related to print quality are all specified on a computer screen. The way these settings are made differ between Microsoft Windows 2000/XP and 98/Me.

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3.1 Before Parts Replacement

3.1.1 Cartridge Removal at Trouble Eruption

0005-8517

If trouble erupts in the printer, be sure to remove the two kinds of cartridges, EP-87 toner cartridges and drum cartridge, following the procedures below. If the cartridges are removed in normal way, it may cause damage to the printer.

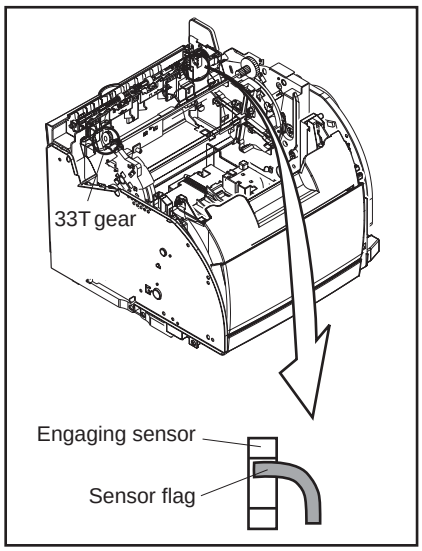
When removing cartridges, be sure to turn ON/OFF according to the following procedure.

Power switch ON/OFF procedure
OFF ON (after more than 5 seconds) OFF

3.1.2 Toner cartridge removal

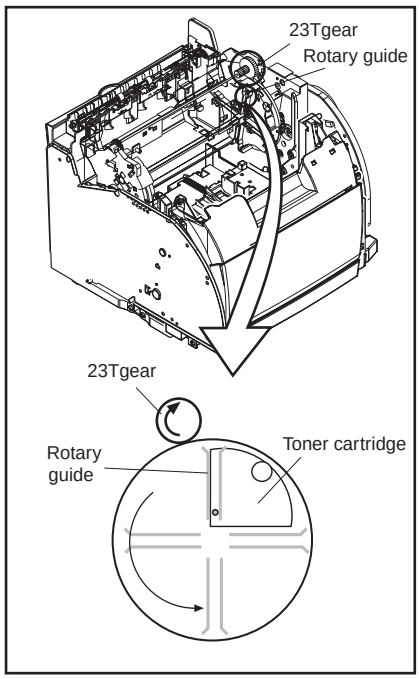
0005-8518

1) Remove the reinforcement plate.
2) Be sure that the engaging sensor flag is at the position as shown in the following figure(in toner cartridges memory tag contact disengaging status).
If the sensor flag is not at the position in the following figure(in toner cartridges memory tag contact engaging status), rotate the 33T gear by hands so that it is at the position.



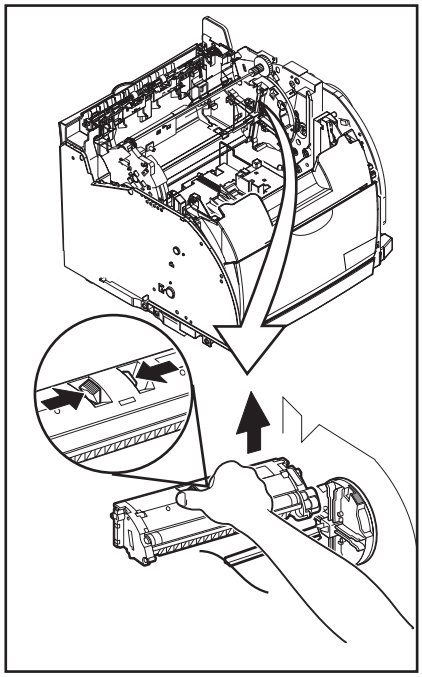
F-3-1

3) Rotate the 23T gear by hands in the direction of the arrow so that the rotary guide of the toner cartridge is at the top.



F-3-2

4) Grasp the finger holding on the toner cartridge and remove the cartridge in a horizontal position from the printer.



F-3-3

5) Repeat the steps 3) and 4) to remove the toner cartridges for each color.

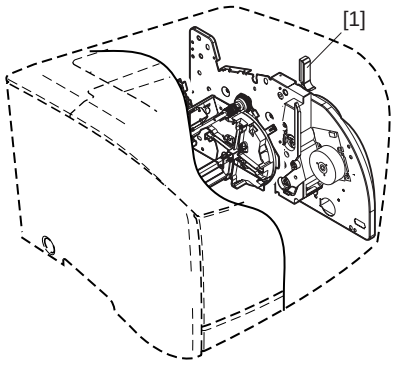
3.1.3 Drum cartridge removal

0005-8531

1) Open the top cover unit and remove the drum cartridge.

⚠ When removing the drum cartridge with the top cover unit detached, be sure to pull up the drive release lever [1]. The drum cartridge cannot be removed otherwise.

2) Remove the drum cartridge from the printer.



F-3-4

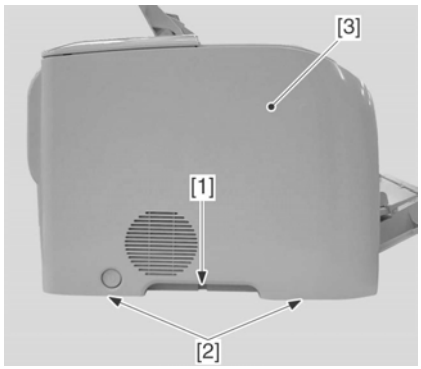
3.2 EXTERNAL AND CONTROLS SYSTEM

3.2.1 Rear Cover

3.2.1.1 Removing the Rear Cover

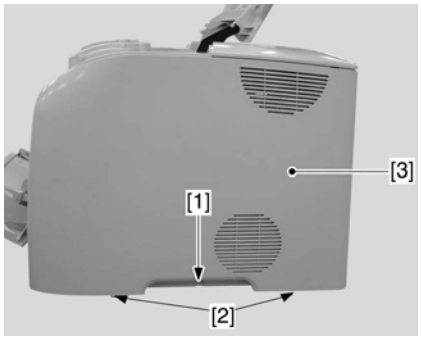
0005-8734

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



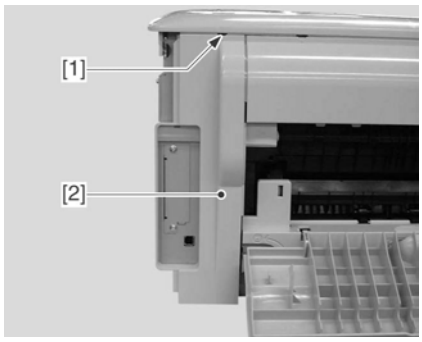
F-3-5

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



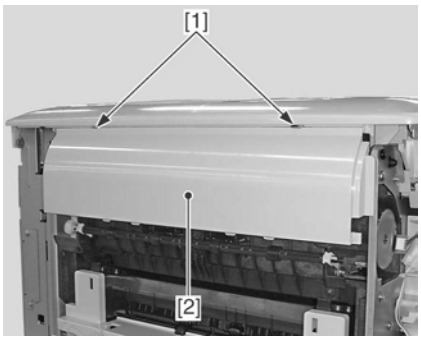
F-3-6

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



F-3-7

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



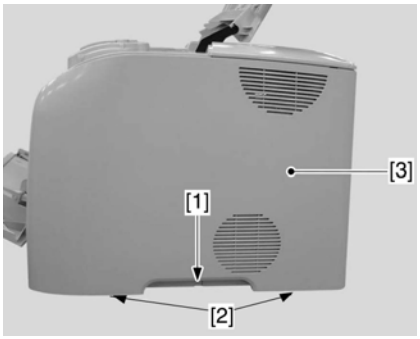
F-3-8

3.2.2 Right Cover

3.2.2.1 Removing the Rght Cover Unit

0005-8725

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



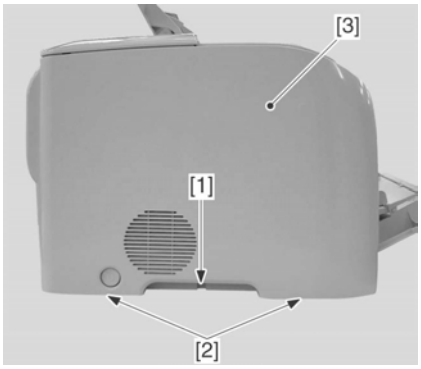
F-3-9

3.2.3 Left Cover

3.2.3.1 Removing the Left Cover

0005-8706

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



F-3-10

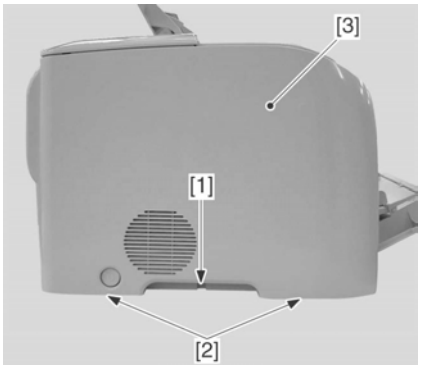
3.2.4 Upper Cover

3.2.4.1 Removing the Upper Cover Unit

0005-8712

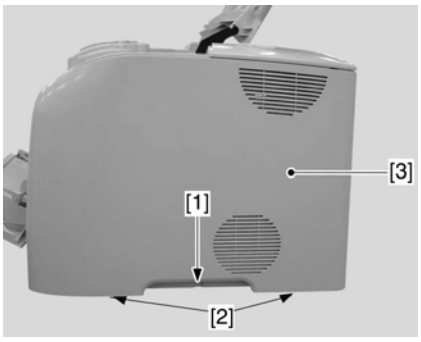
1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].

3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



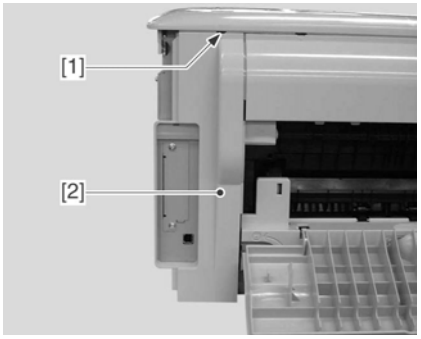
F-3-11

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



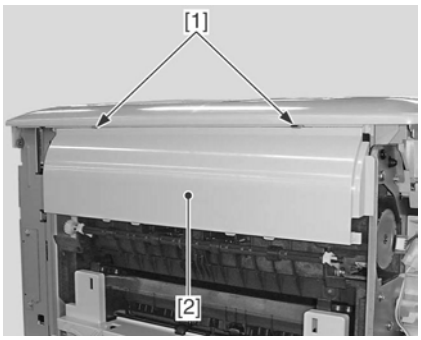
F-3-12

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



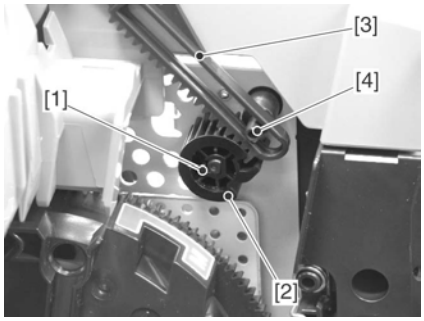
F-3-13

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



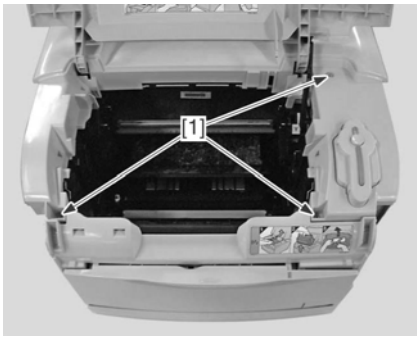
F-3-14

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



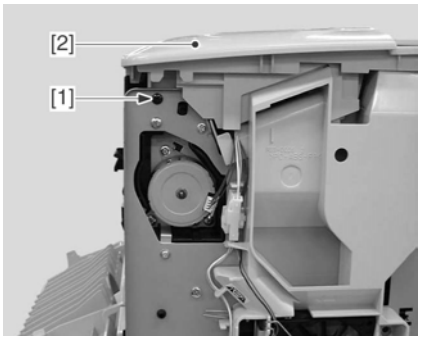
F-3-15

11) Remove the three screws [1].



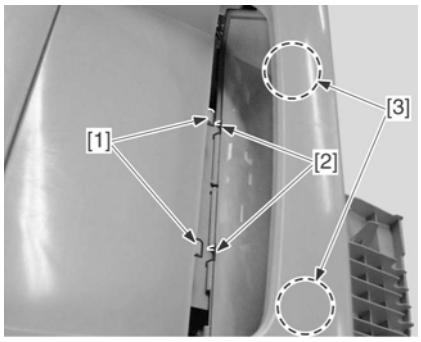
F-3-16

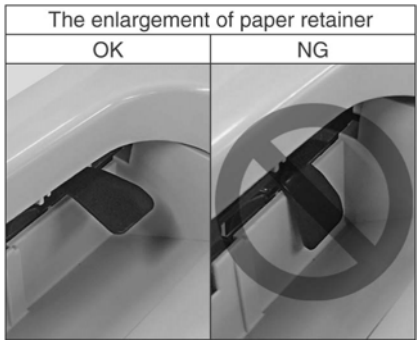
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-17

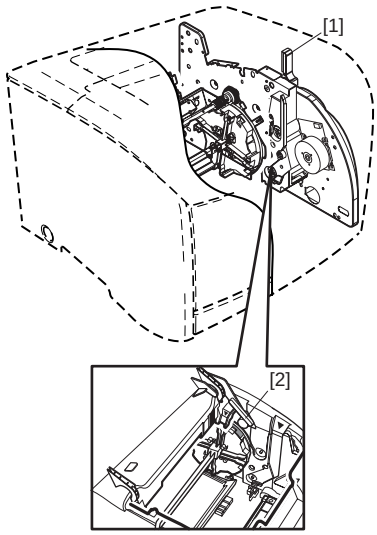
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



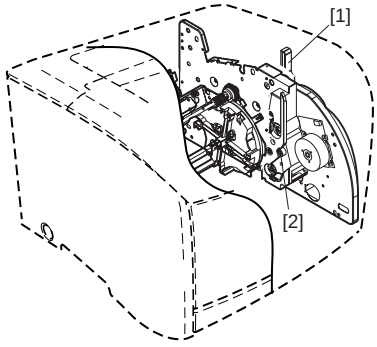


F-3-18

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-19



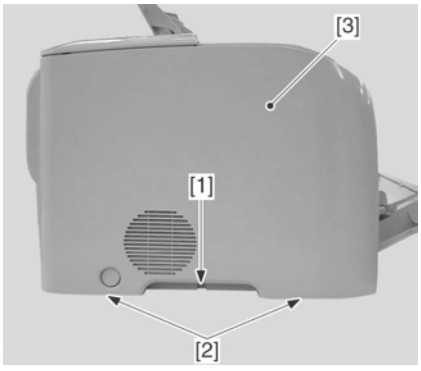
F-3-20

3.2.5 Front Cover

3.2.5.1 Removing the Left Cover

0007-8191

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.

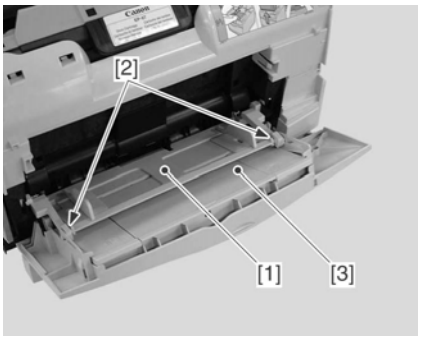


F-3-21

3.2.5.2 Removing the Front Cover Unit

0005-8730

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.



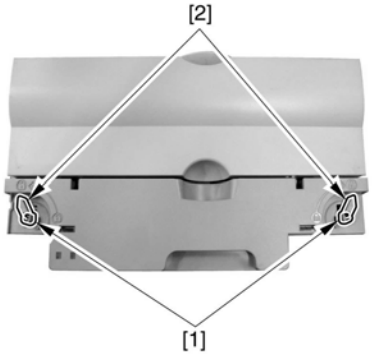
F-3-22

3.2.6 Face-up Cover

3.2.6.1 Removing the Face-up Cover

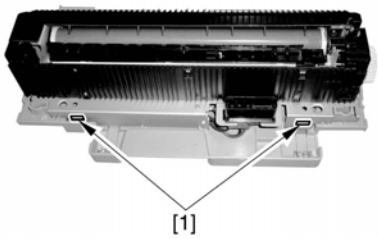
0008-0136

1) Unhook the two claws [1] and remove the two levers [2] from the fixing unit.



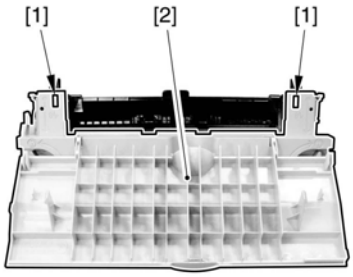
F-3-23

2) Unhook the two claws [1].



F-3-24

3) Unhook the two claws [1] and remove the face-up cover [2] from the fixing unit.



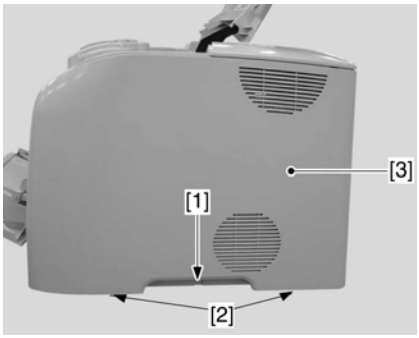
F-3-25

3.2.7 I/O Cover

3.2.7.1 Removing the I/O Cover

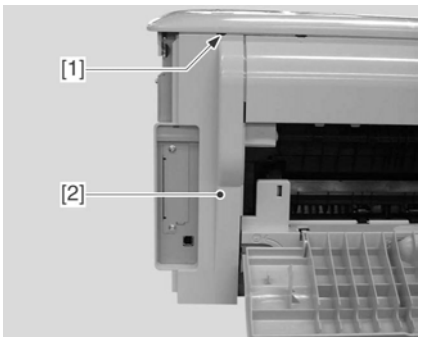
0005-8743

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the five claws [2].
3) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



F-3-26

4) Open the face-up cover.
5) Unhook the claw [1] and remove the I/O cover [2] from the printer.



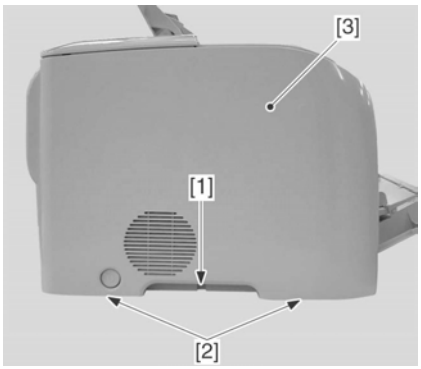
F-3-27

3.2.8 Main Drive Unit

3.2.8.1 Removing the Upper Cover Unit

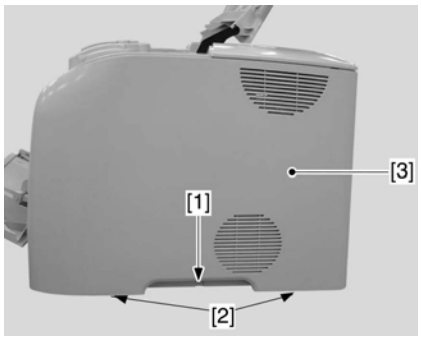
0007-8194

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



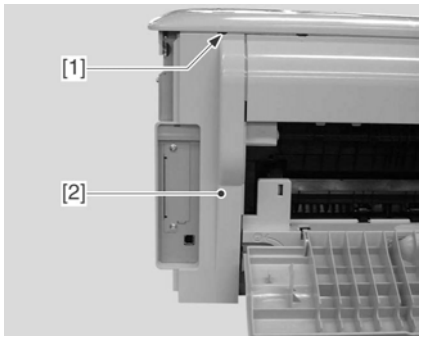
F-3-28

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



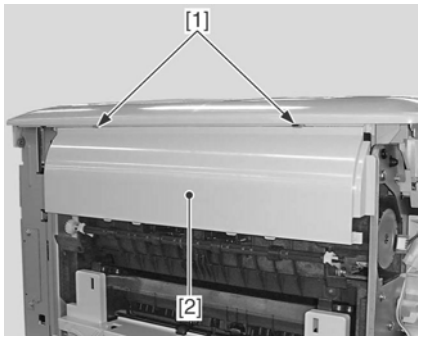
F-3-29

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



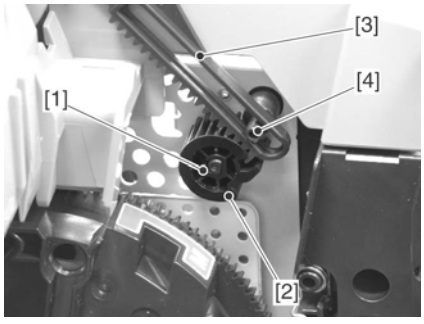
F-3-30

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



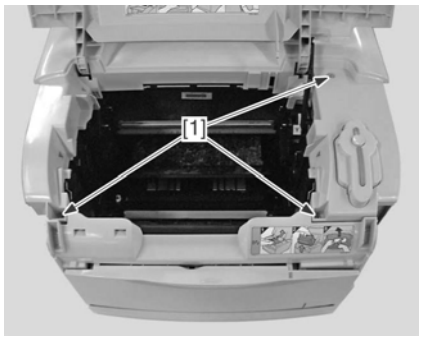
F-3-31

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



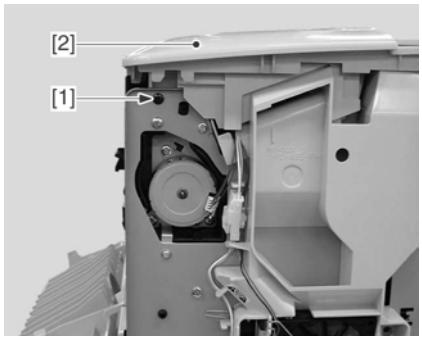
F-3-32

11) Remove the three screws [1].



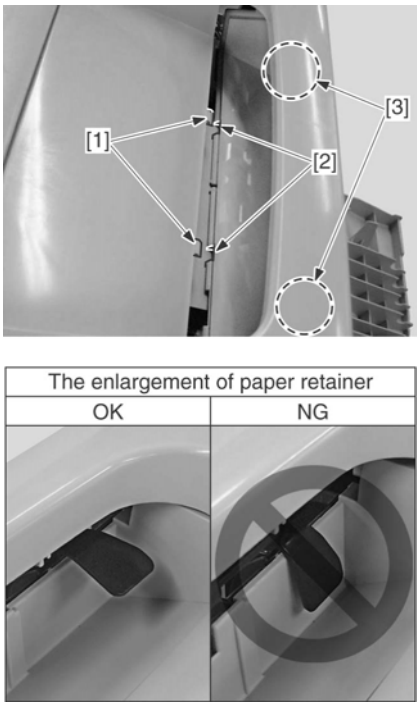
F-3-33

12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



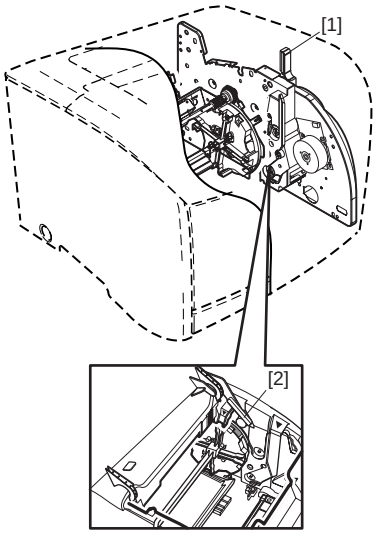
F-3-34

⚠
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.

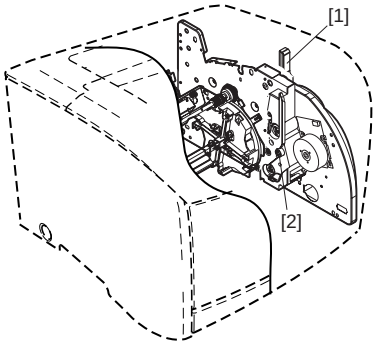


F-3-35

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-36

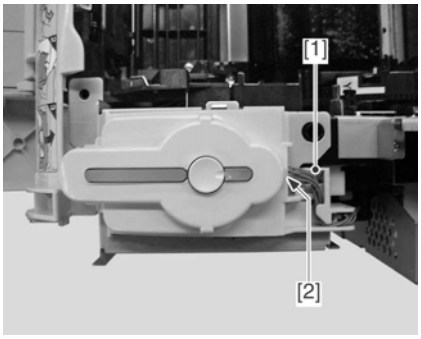


F-3-37

3.2.8.2 Removing the Control Panel

0007-8195

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

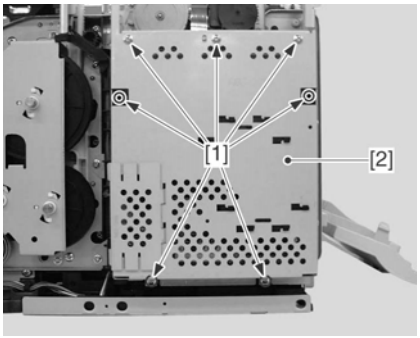


F-3-38

3.2.8.3 Removing the Video Controller PCB

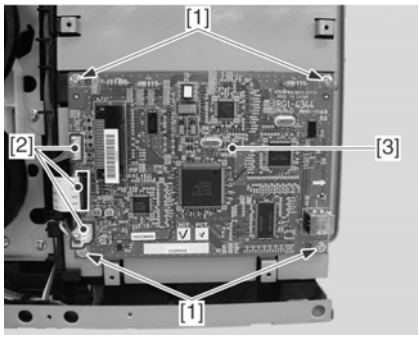
0007-8196

1) Remove the seven screws [1], and detach the shield cover.



F-3-39

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



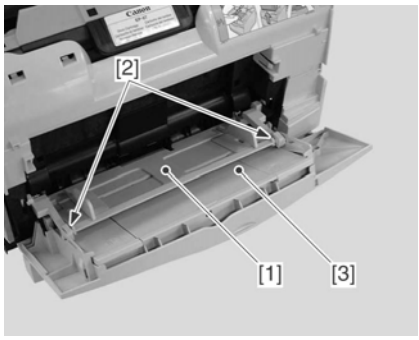
F-3-40

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.8.4 Removing the Front Cover Unit

0007-8197

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

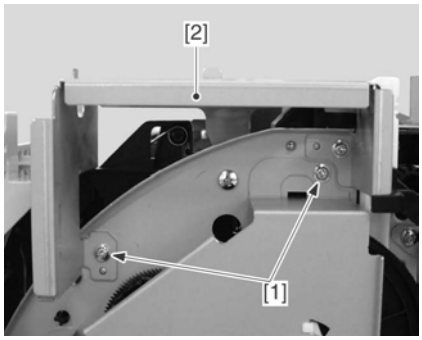


F-3-41

3.2.8.5 Removing the Main Drive Unit

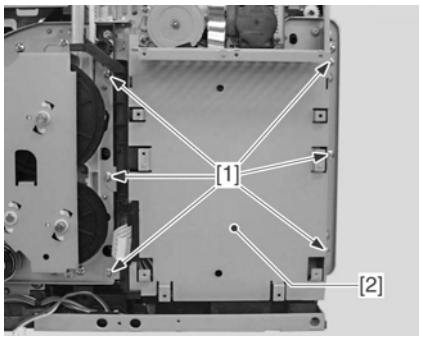
0005-8767

1) Remove the 2 screws [1], and detach the control panel mount [2].



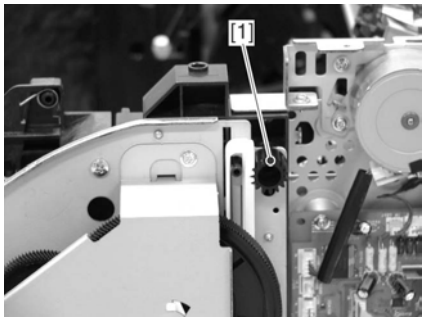
F-3-42

2) Remove the 6 screws [1], and detach the shield mount [2].



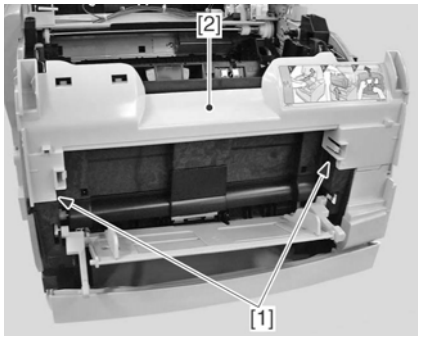
F-3-43

3) Remove the 18T gear [1].



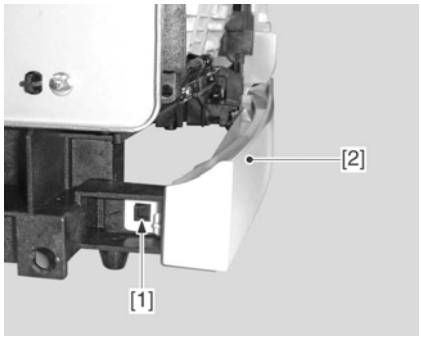
F-3-44

4) Free the 2 claws [1], and detach the inside cover [2].



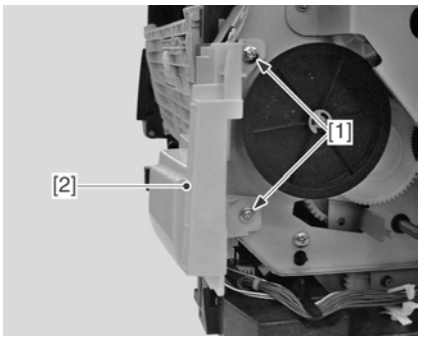
F-3-45

5) Free the claw [1], and detach the lower front cover [2].



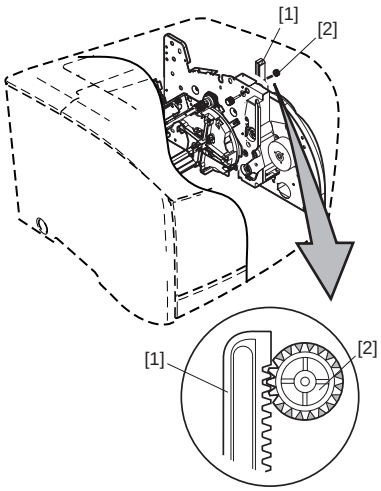
F-3-46

6) Remove the 2 screws [1], and detach the front auxiliary cover [2].



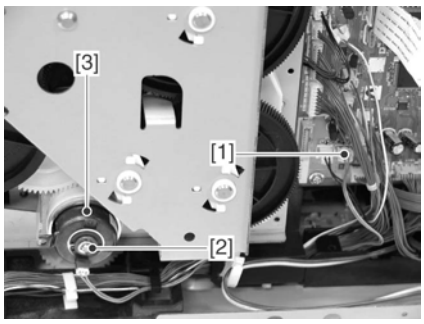
F-3-47

⚠ When installing the main drive unit, be sure to pull up the drive release lever [1] (drive release status) before installing the 18T gear [2] as shown in the figure right side.
Note that the 18T gear may not engage with the drive release lever if the gear is not placed properly.



F-3-48

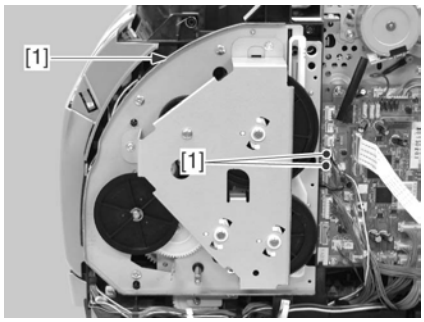
7) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



F-3-49

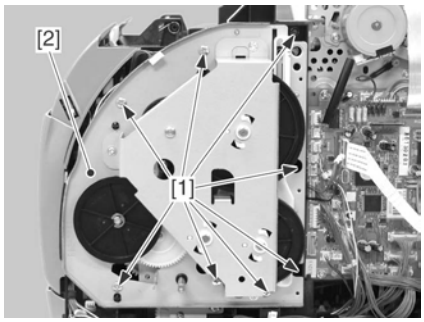
⚠ The connector on the registration clutch side cannot be disconnected. When removing the registration clutch, be sure to disconnect the connector on the DC controller PCB (J113).

8) Disconnect the three connectors [1].



F-3-50

9) Remove the eight screws [1] and the main drive unit [2].



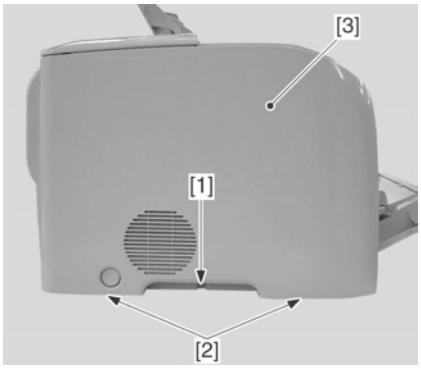
F-3-51

3.2.9 Main Motor

3.2.9.1 Removing the Upper Cover Unit

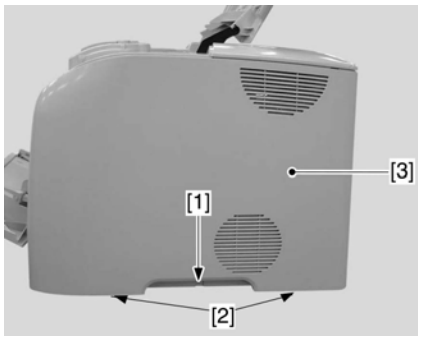
0007-8198

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



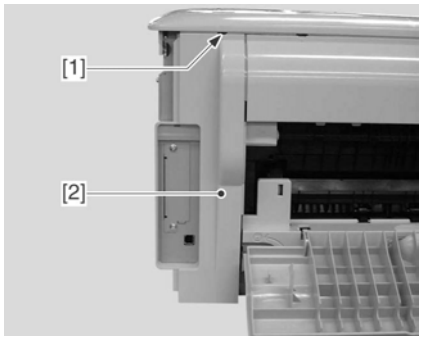
F-3-52

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



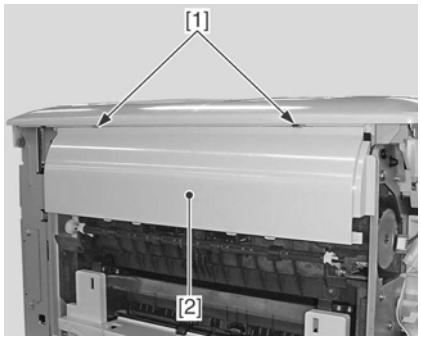
F-3-53

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



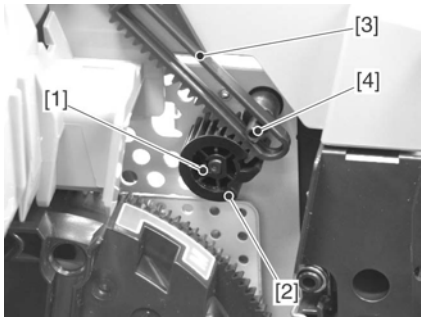
F-3-54

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



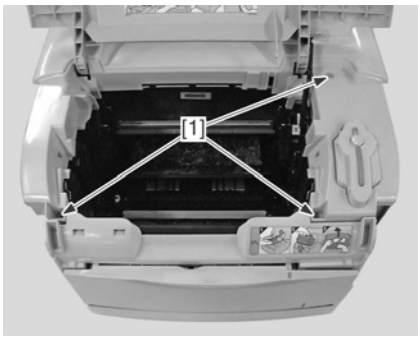
F-3-55

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



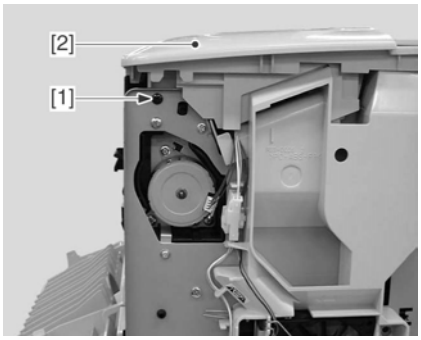
F-3-56

11) Remove the three screws [1].



F-3-57

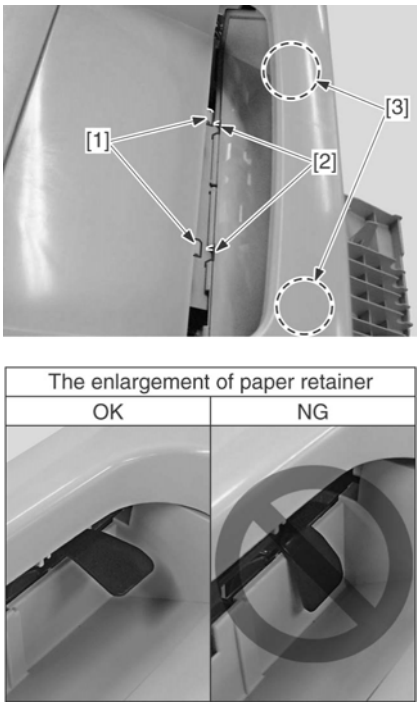
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-58

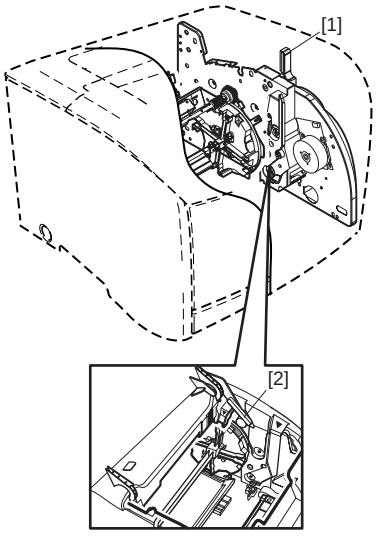
⚠

1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.

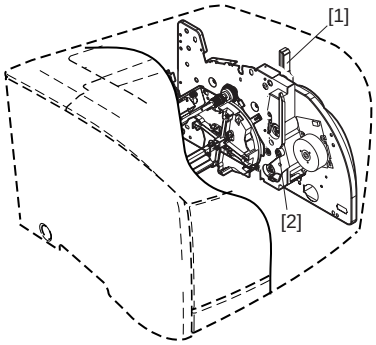


F-3-59

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-60

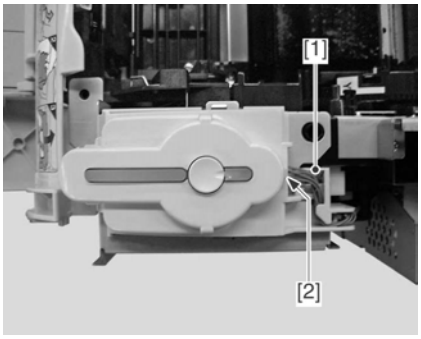


F-3-61

3.2.9.2 Removing the Control Panel

0007-8199

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

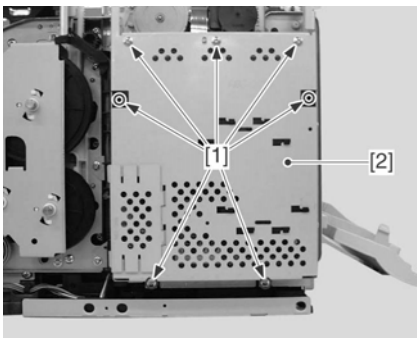


F-3-62

3.2.9.3 Removing the Video Controller PCB

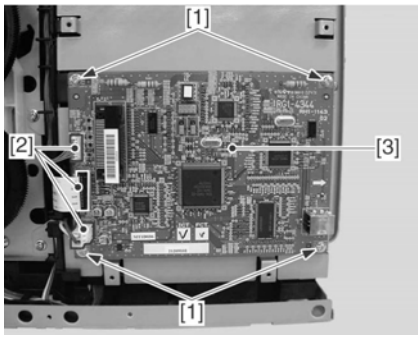
0007-8200

1) Remove the seven screws [1], and detach the shield cover.



F-3-63

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



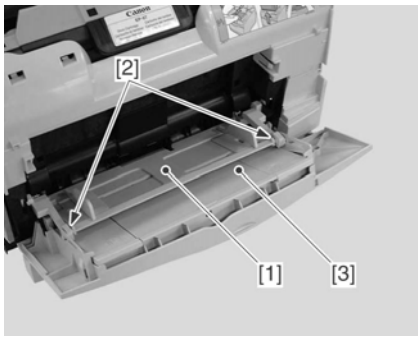
F-3-64

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.9.4 Removing the Front Cover Unit

0007-8201

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

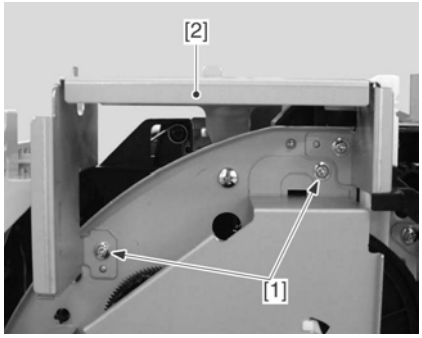


F-3-65

3.2.9.5 Removing the Main Drive Unit

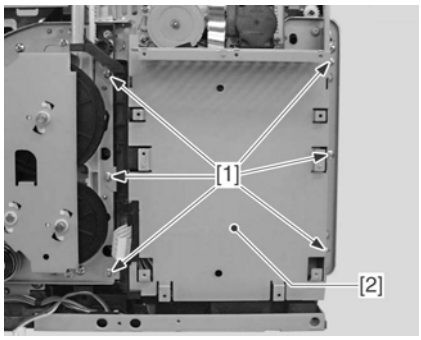
0007-8202

1) Remove the 2 screws [1], and detach the control panel mount [2].



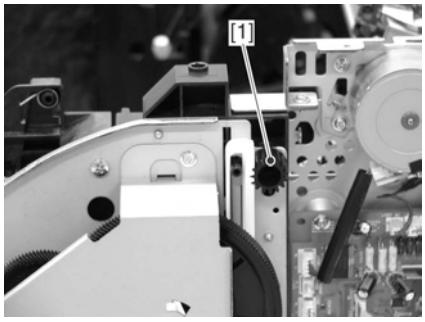
F-3-66

2) Remove the 6 screws [1], and detach the shield mount [2].



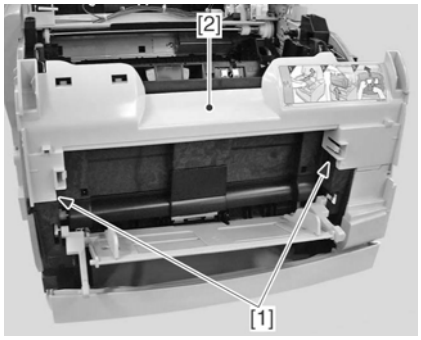
F-3-67

3) Remove the 18T gear [1].



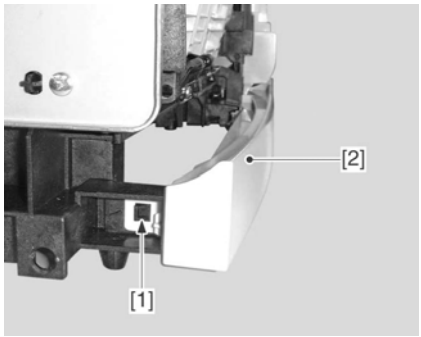
F-3-68

4) Free the 2 claws [1], and detach the inside cover [2].



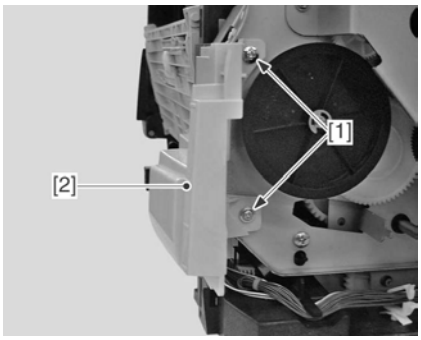
F-3-69

5) Free the claw [1], and detach the lower front cover [2].



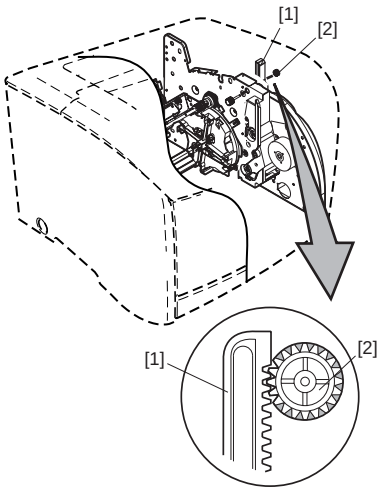
F-3-70

6) Remove the 2 screws [1], and detach the front auxiliary cover [2].



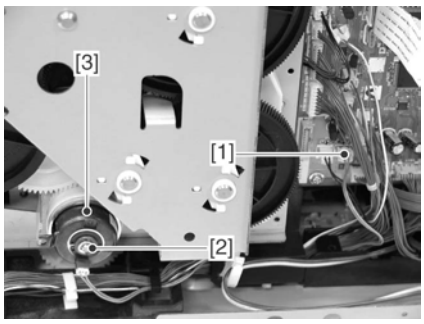
F-3-71

⚠ When installing the main drive unit, be sure to pull up the drive release lever [1] (drive release status) before installing the 18T gear [2] as shown in the figure right side.
Note that the 18T gear may not engage with the drive release lever if the gear is not placed properly.



F-3-72

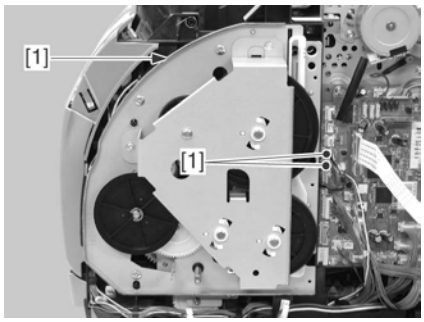
7) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



F-3-73

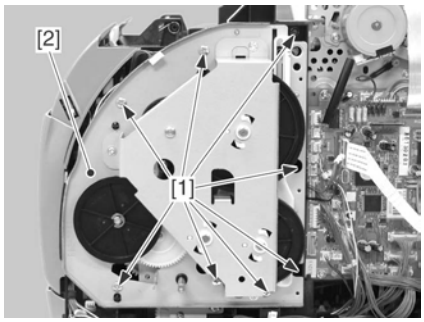
⚠ The connector on the registration clutch side cannot be disconnected. When removing the registration clutch, be sure to disconnect the connector on the DC controller PCB (J113).

8) Disconnect the three connectors [1].



F-3-74

9) Remove the eight screws [1] and the main drive unit [2].

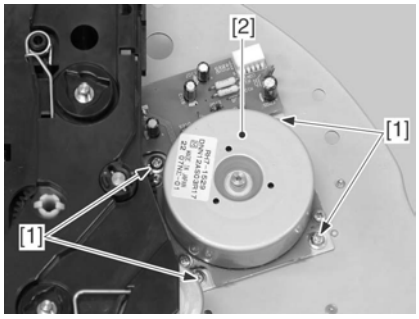


F-3-75

3.2.9.6 Removing the Main Motor

0005-8998

1) Remove the four screws [1] and the main motor [2].



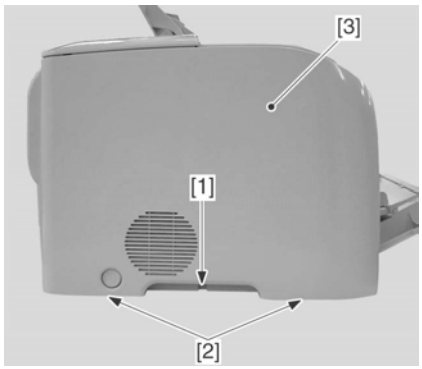
F-3-76

3.2.10 Control Panel

3.2.10.1 Removing the Upper Cover Unit

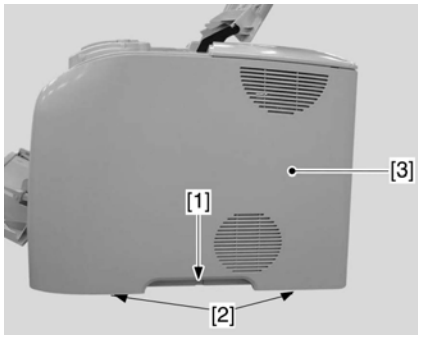
0007-8192

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



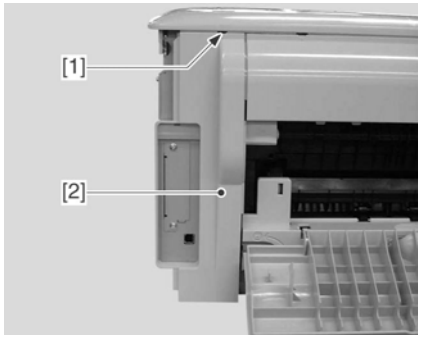
F-3-77

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



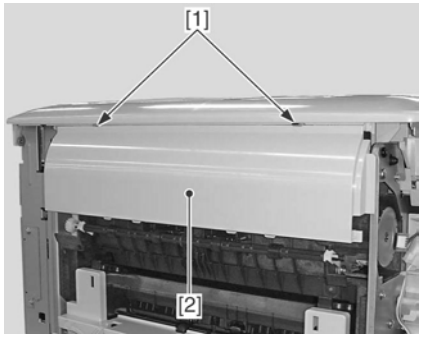
F-3-78

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



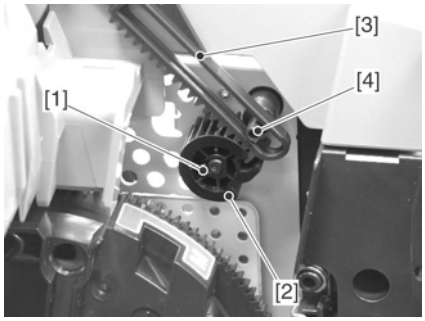
F-3-79

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



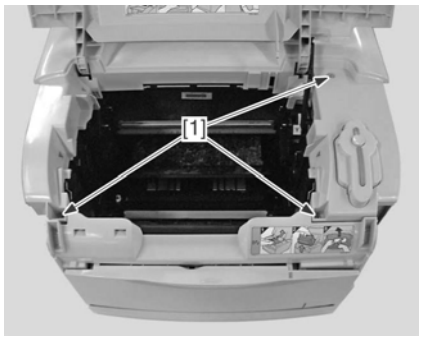
F-3-80

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



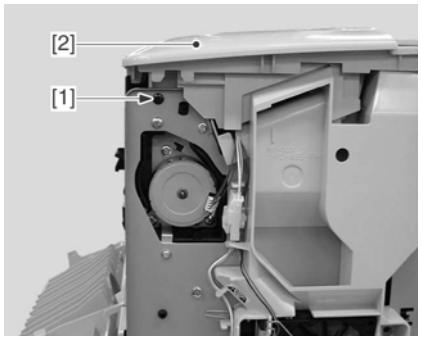
F-3-81

11) Remove the three screws [1].



F-3-82

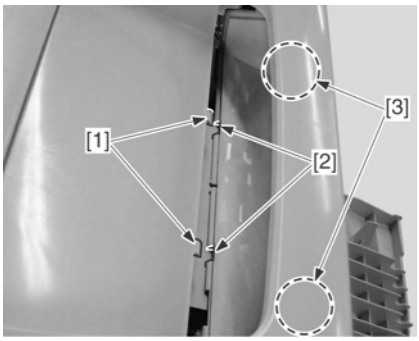
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.

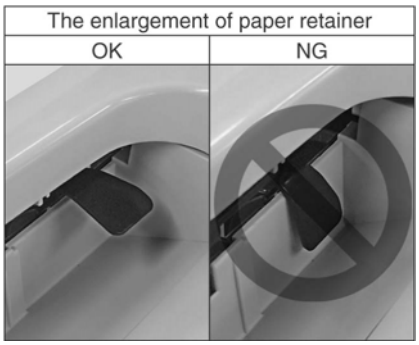


F-3-83

⚠

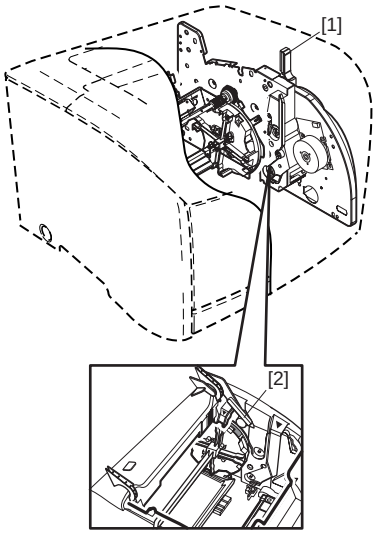
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



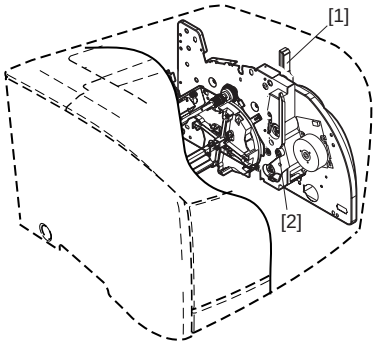


F-3-84

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-85

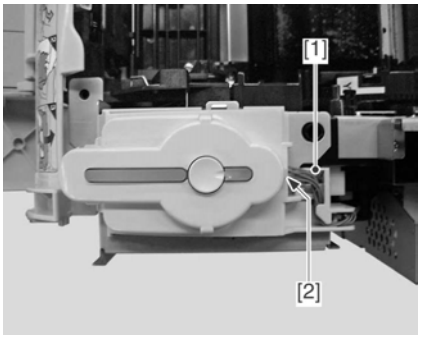


F-3-86

3.2.10.2 Removing the Control Panel

0005-8749

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.



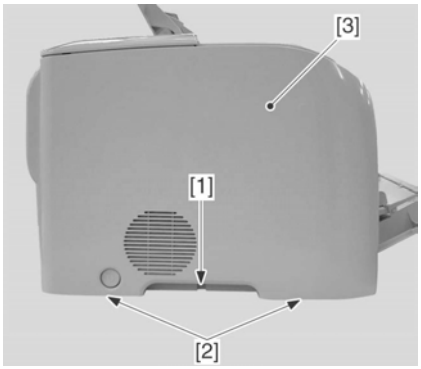
F-3-87

3.2.11 DC Controller PCB

3.2.11.1 Removing the Upper Cover Unit

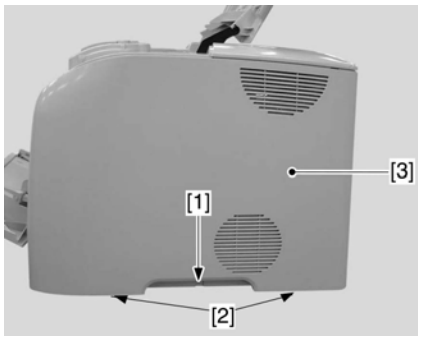
0007-8203

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



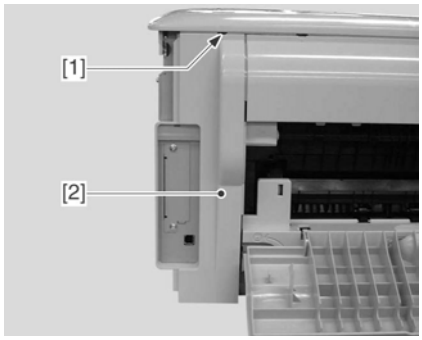
F-3-88

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



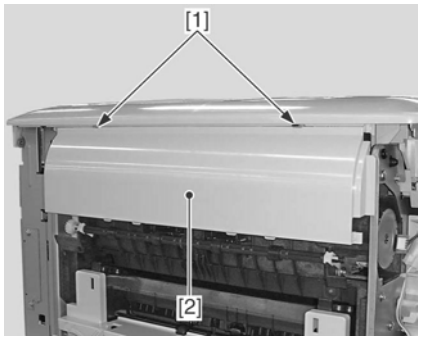
F-3-89

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



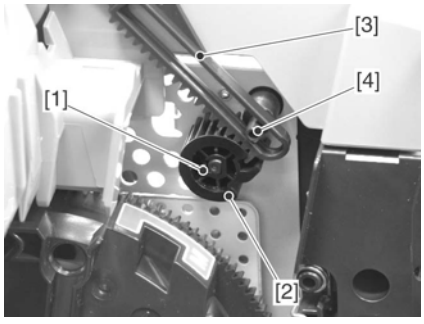
F-3-90

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



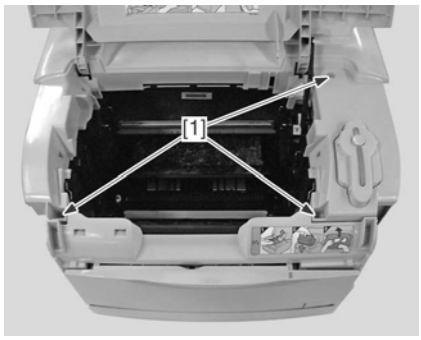
F-3-91

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



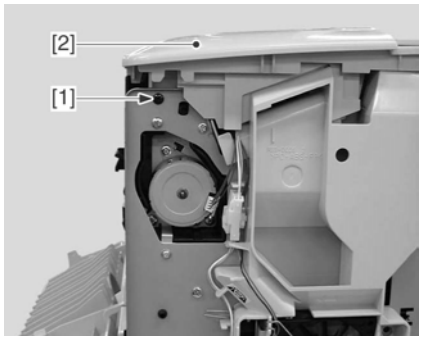
F-3-92

11) Remove the three screws [1].



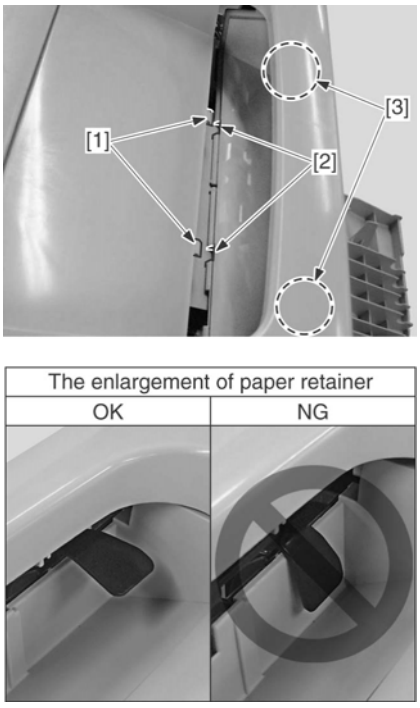
F-3-93

12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.

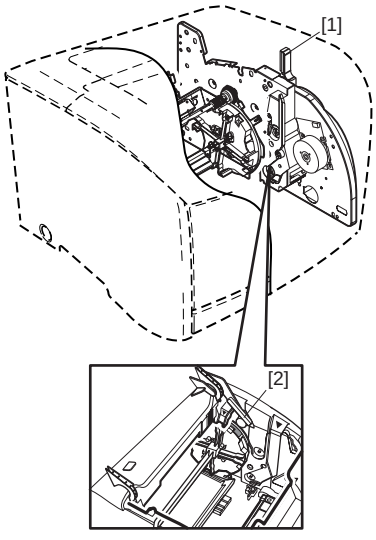


F-3-94

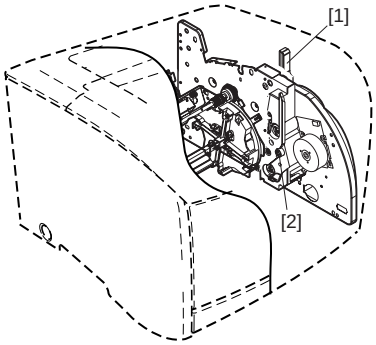
⚠
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



F-3-95



F-3-96

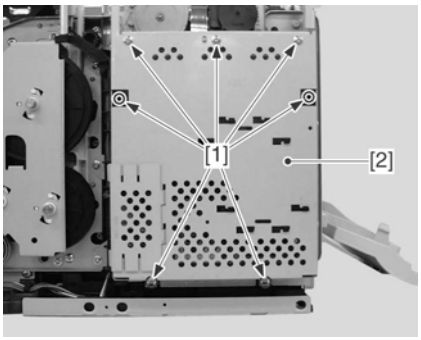


F-3-97

3.2.11.2 Removing the Video Controller PCB

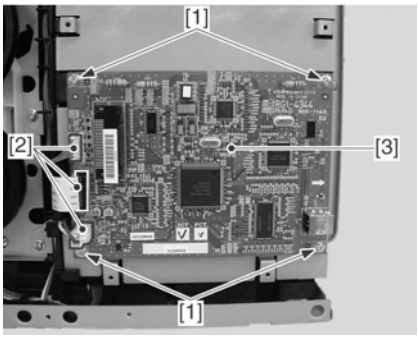
0007-8204

1) Remove the seven screws [1], and detach the shield cover.



F-3-98

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



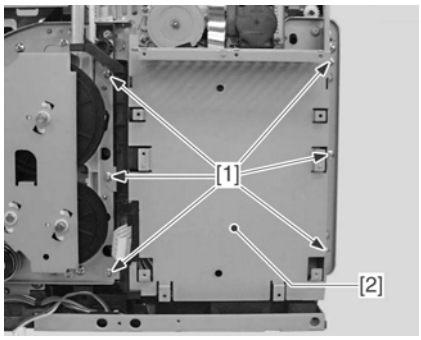
F-3-99

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.11.3 Removing the DC Controller PCB

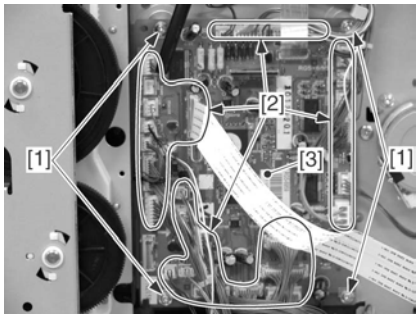
0005-9009

1) Remove the 6 screws [1], and detach the shield mount [2].



F-3-100

2) Remove the four screws [1] and disconnect the 28 connectors [2]. Remove the DC controller PCB [3].



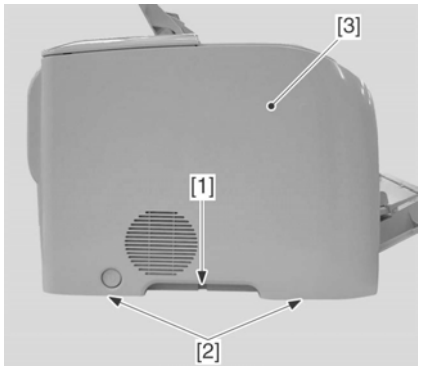
F-3-101

3.2.12 Interface Controller PCB

3.2.12.1 Removing the Upper Cover Unit

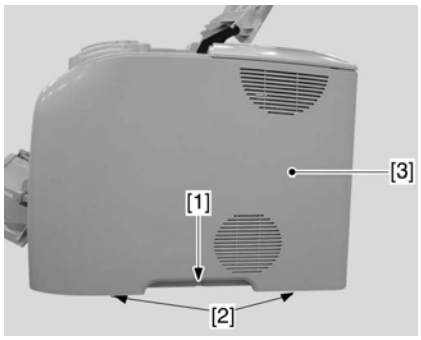
0007-8193

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



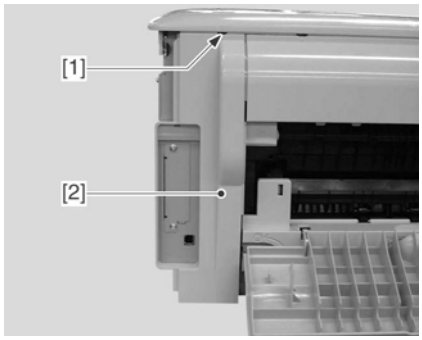
F-3-102

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



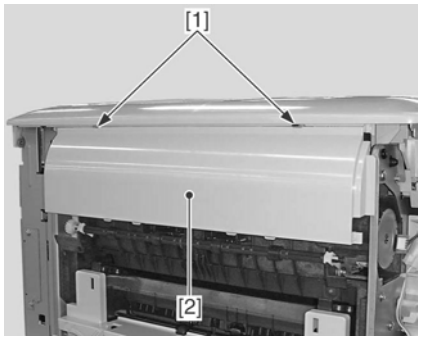
F-3-103

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



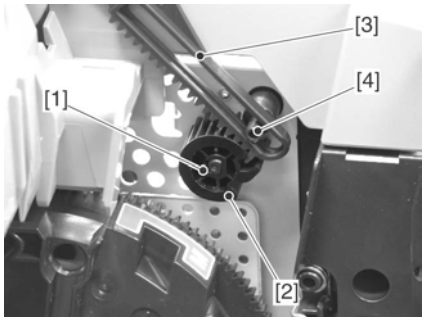
F-3-104

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



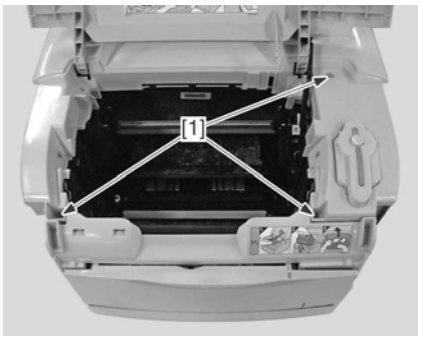
F-3-105

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



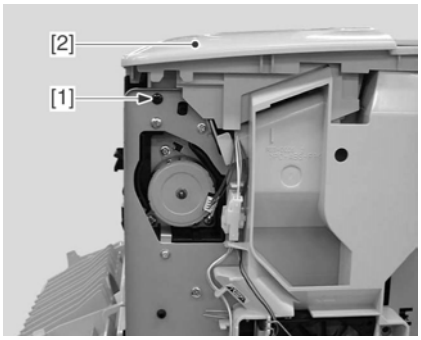
F-3-106

11) Remove the three screws [1].



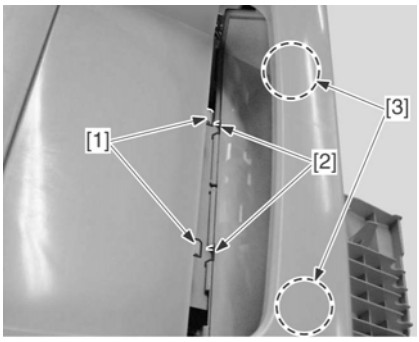
F-3-107

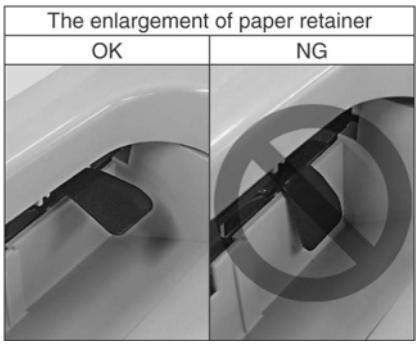
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-108

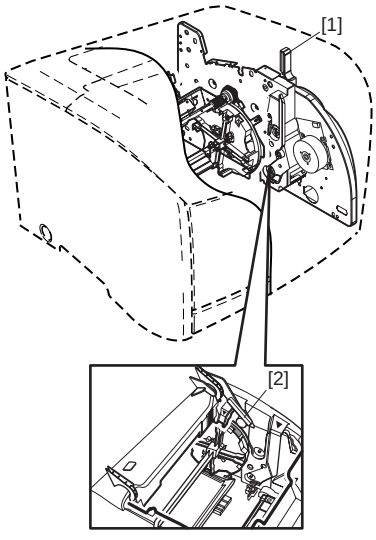
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



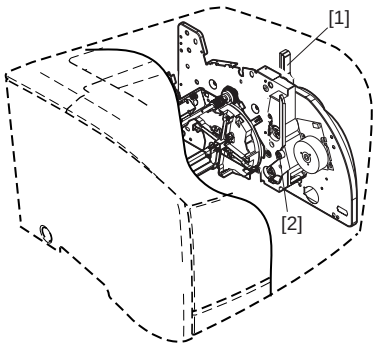


F-3-109

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-110

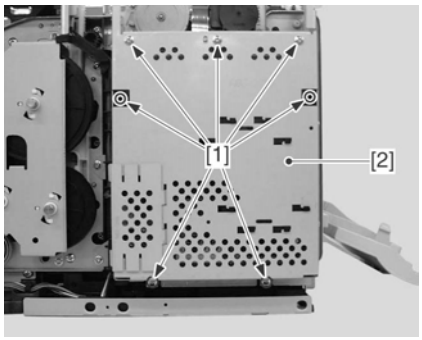


F-3-111

3.2.12.2 Removing the Video Controller PCB

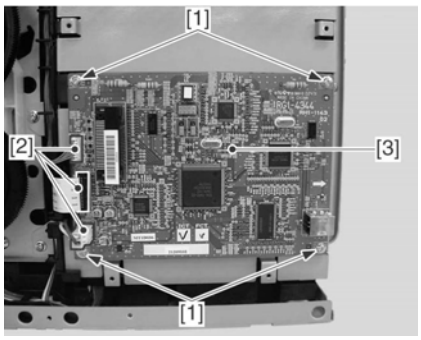
0005-9010

1) Remove the seven screws [1], and detach the shield cover.



F-3-112

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



F-3-113

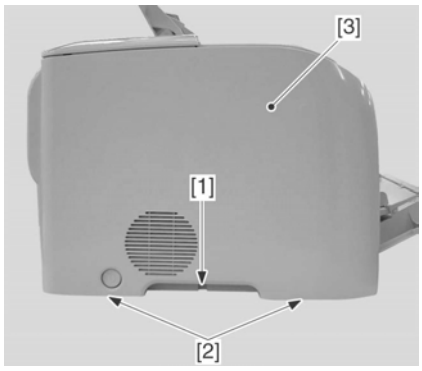
If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.13 Power Supply Board

3.2.13.1 Removing the Upper Cover Unit

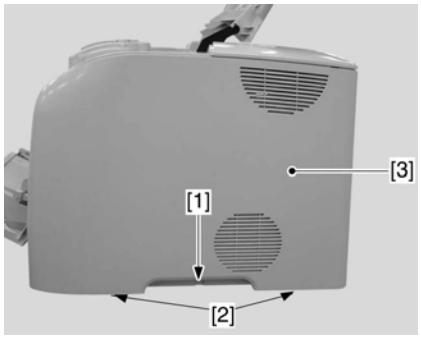
0007-8205

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



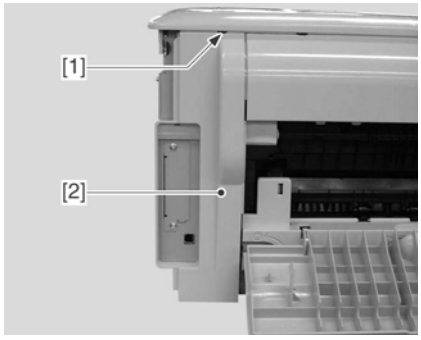
F-3-114

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



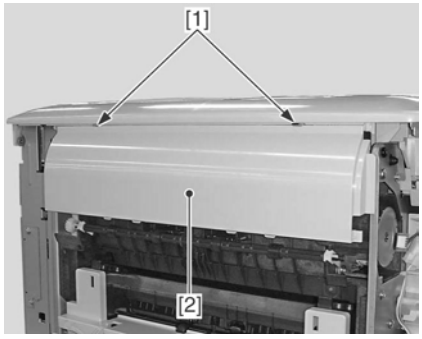
F-3-115

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



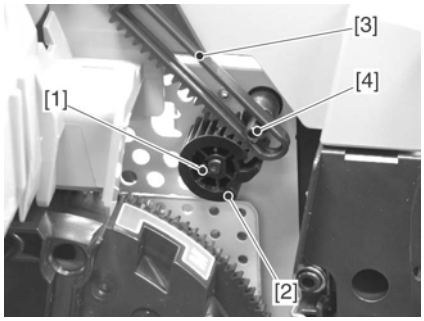
F-3-116

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



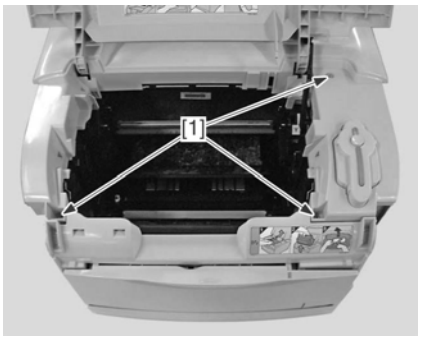
F-3-117

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



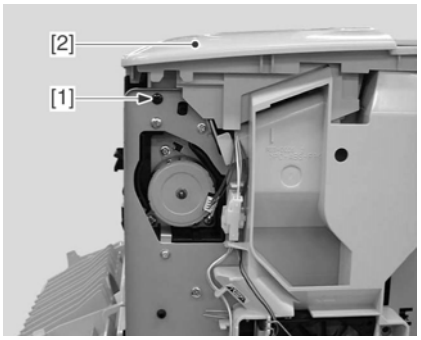
F-3-118

11) Remove the three screws [1].



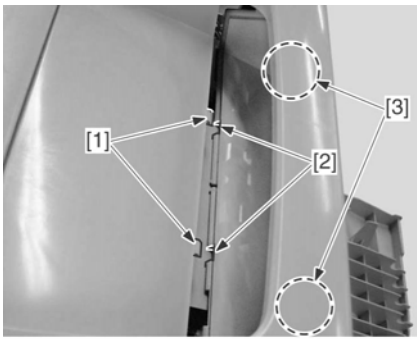
F-3-119

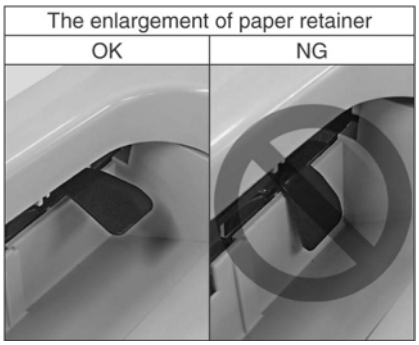
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-120

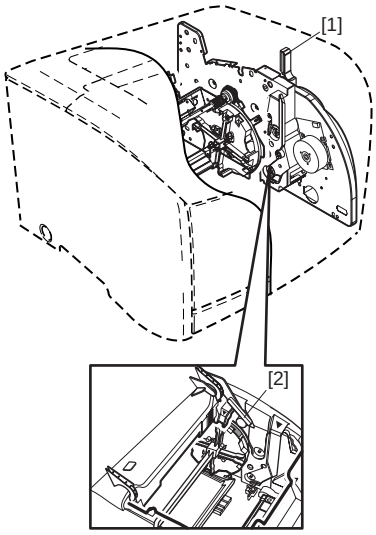
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



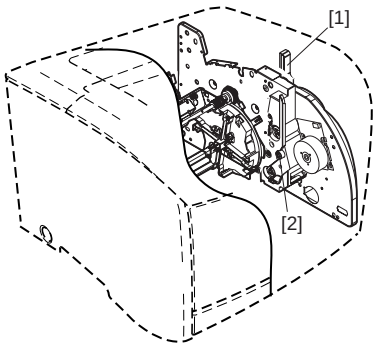


F-3-121

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-122

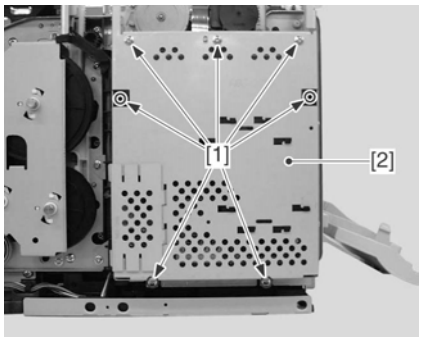


F-3-123

3.2.13.2 Removing the Video Controller PCB

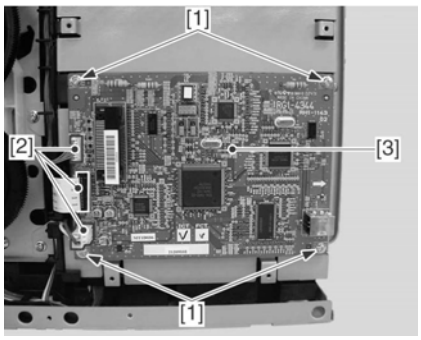
0007-8206

1) Remove the seven screws [1], and detach the shield cover.



F-3-124

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



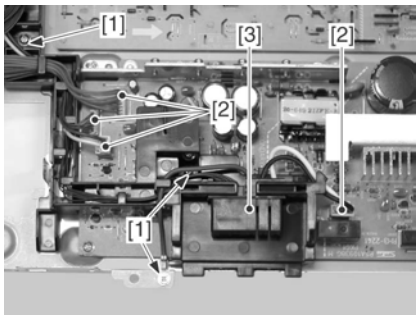
F-3-125

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.13.3 Removing the Power Supply Unit

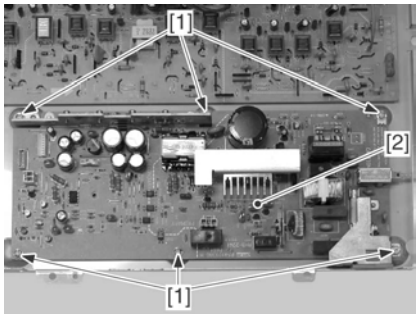
0005-9008

1) Remove the three screws [1] and disconnect the four connectors [2]. Remove the cable guide [3].



F-3-126

2) Remove the six screws [1] and the power supply unit [2] from the lower case unit.



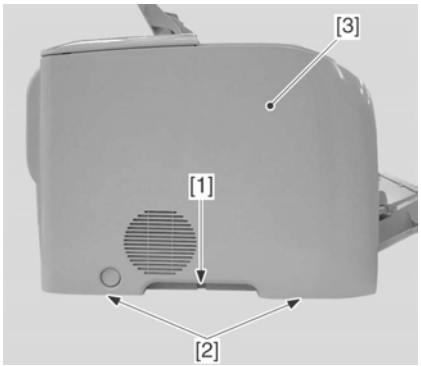
F-3-127

3.2.14 High-voltage PCB

3.2.14.1 Removing the Upper Cover Unit

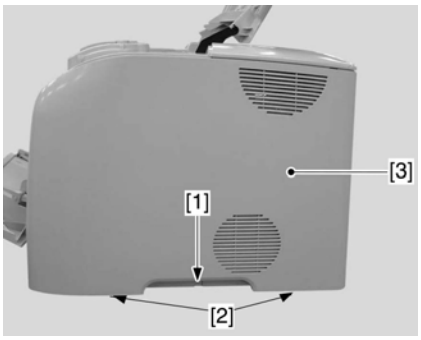
0007-8472

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



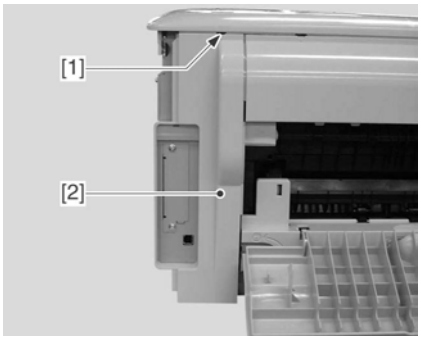
F-3-128

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



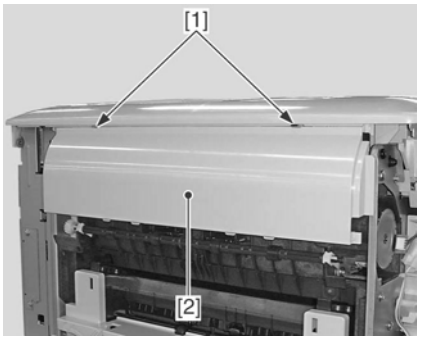
F-3-129

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



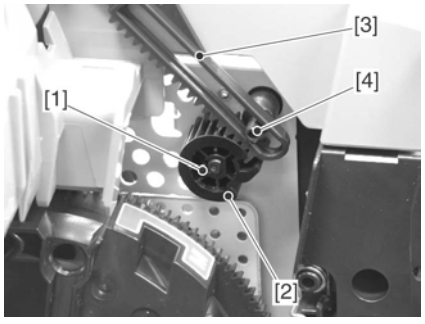
F-3-130

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



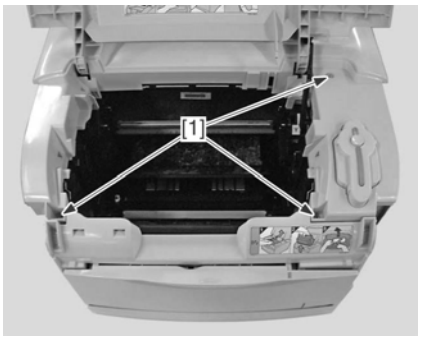
F-3-131

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



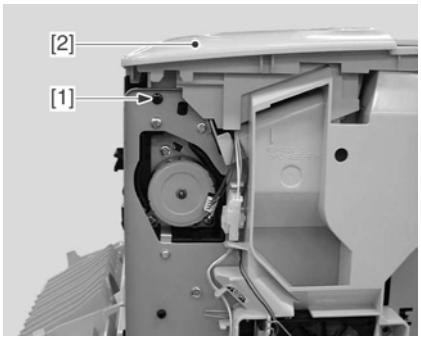
F-3-132

11) Remove the three screws [1].



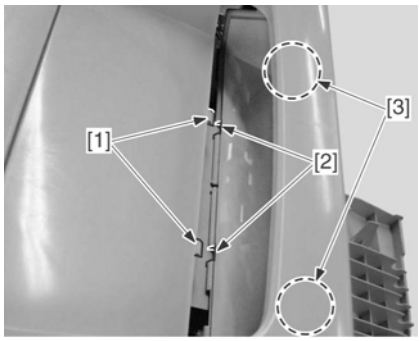
F-3-133

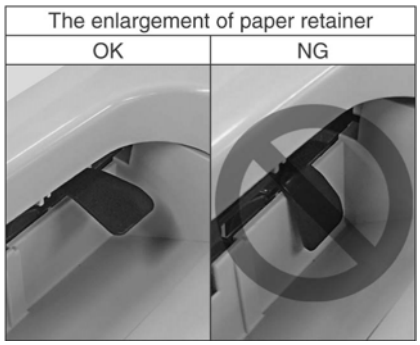
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-134

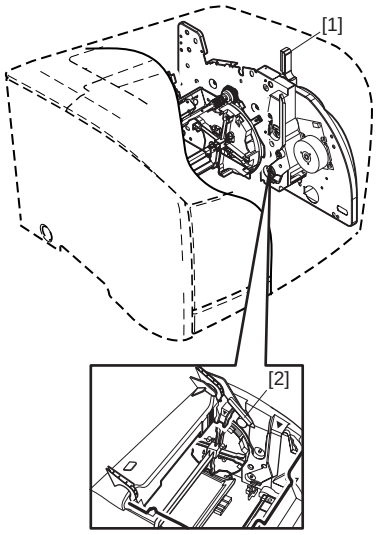
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



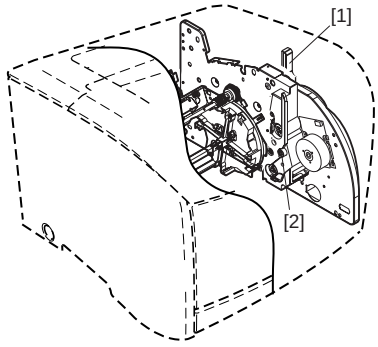


F-3-135

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-136

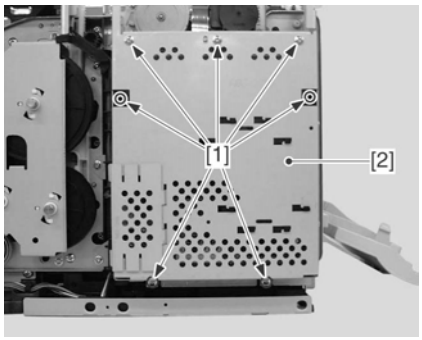


F-3-137

3.2.14.2 Removing the Video Controller PCB

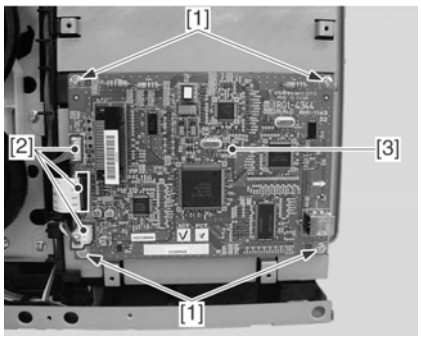
0007-8473

1) Remove the seven screws [1], and detach the shield cover.



F-3-138

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



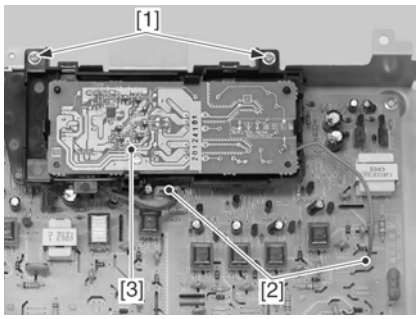
F-3-139

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.14.3 Removing the Sub High-voltage Power Supply PCB

0007-8475

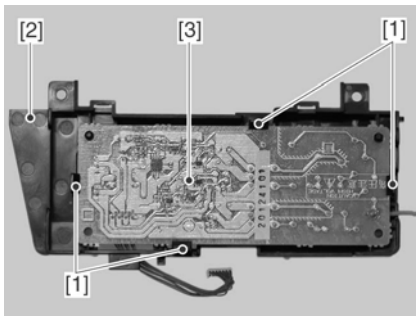
1) Remove the 2 screws [1] and disconnect the 2 connectors [2]. Remove the sub-high voltage power supply PCB [3] together with its PCB holder.



F-3-140

3) Unhook the 4 claws and detach the sub-high voltage power supply PCB [3] from the PCB holder [2].

[1] Connectors

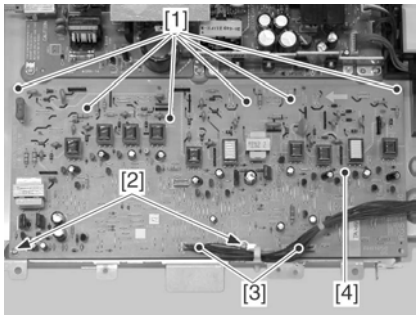


F-3-141

3.2.14.4 Removing the High-voltage Power Supply PCB

0005-9006

1) Unhook the six claws [1] and remove the two screws [2], disconnect the connectors [3]. Remove the high-voltage power supply PCB [4] from the lower case unit.



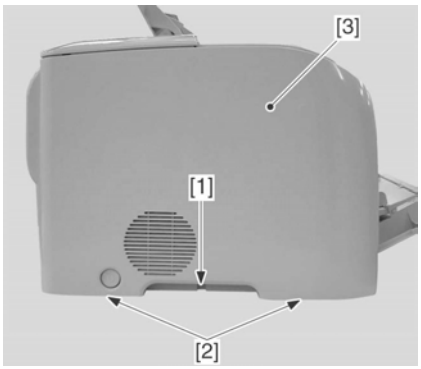
F-3-142

3.2.15 Sub High-Voltage Power Supply PCB

3.2.15.1 Removing the Upper Cover Unit

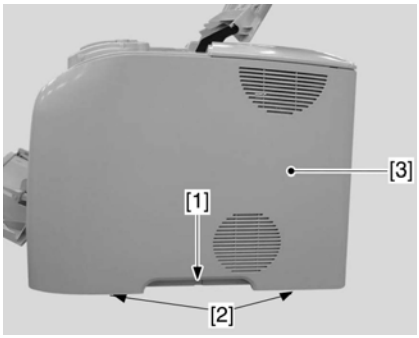
0007-8476

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



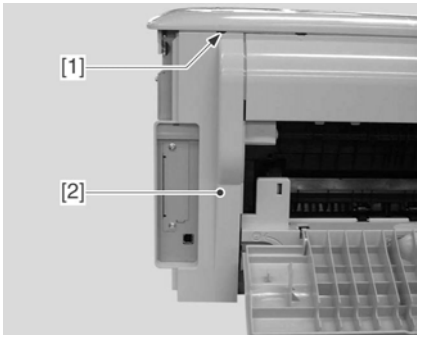
F-3-143

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



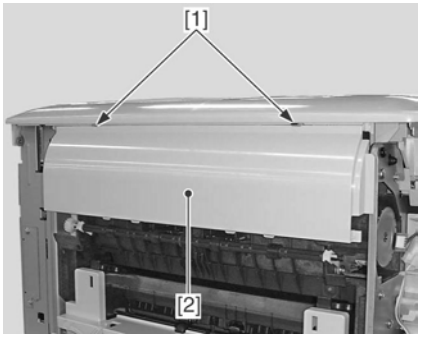
F-3-144

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



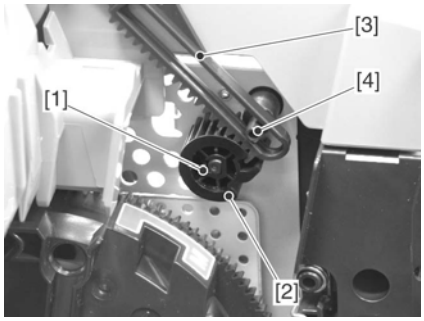
F-3-145

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



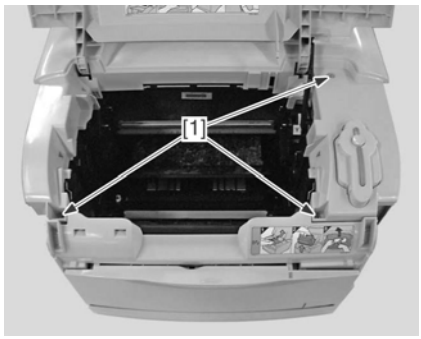
F-3-146

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



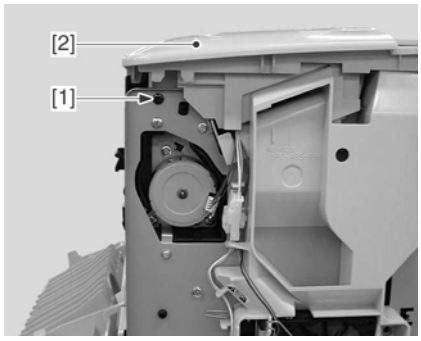
F-3-147

11) Remove the three screws [1].



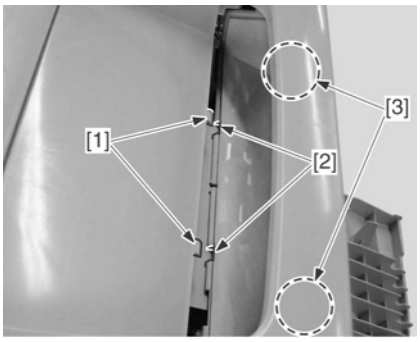
F-3-148

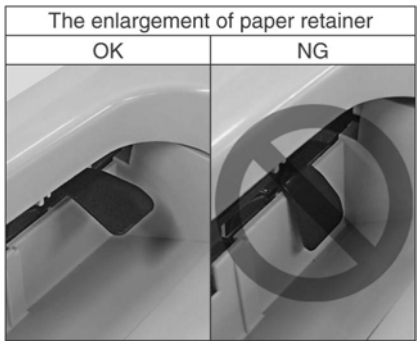
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-149

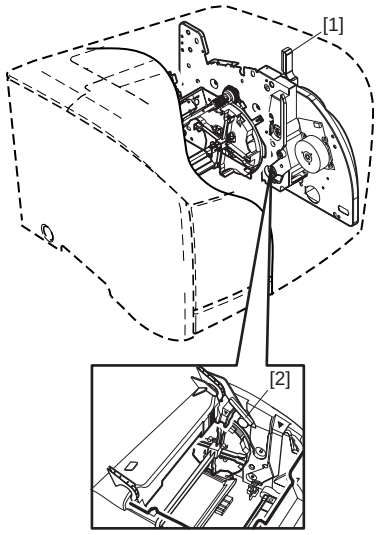
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



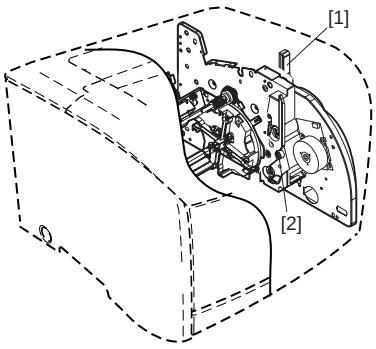


F-3-150

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-151

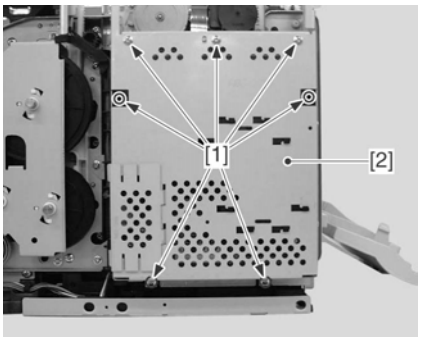


F-3-152

3.2.15.2 Removing the Video Controller PCB

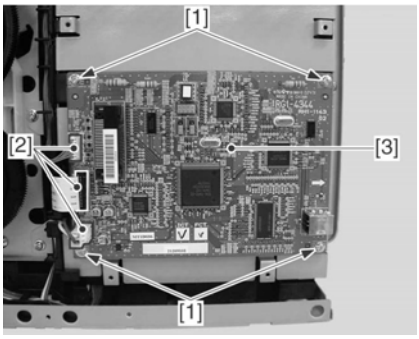
0007-8477

1) Remove the seven screws [1], and detach the shield cover.



F-3-153

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



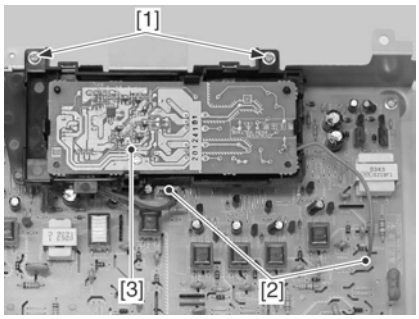
F-3-154

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.15.3 Removing the Sub High-voltage Power Supply PCB

0005-9007

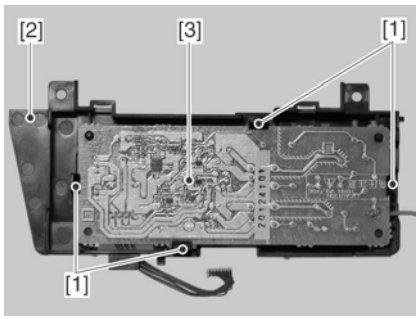
1) Remove the 2 screws [1] and disconnect the 2 connectors [2]. Remove the sub-high voltage power supply PCB [3] together with its PCB holder.



F-3-155

3) Unhook the 4 claws and detach the sub-high voltage power supply PCB [3] from the PCB holder [2].

[1] Connectors



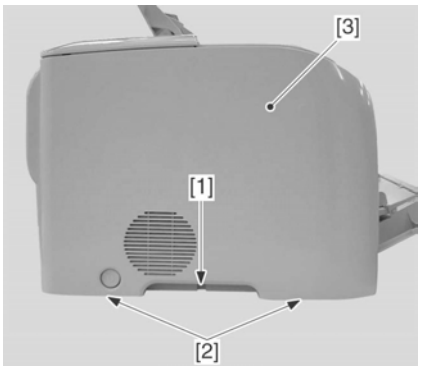
F-3-156

3.2.16 Door Open Detection Swith

3.2.16.1 Removing the Upper Cover Unit

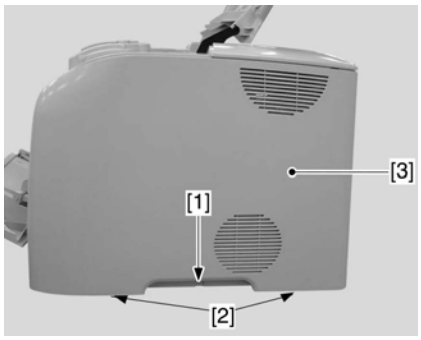
0007-8479

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



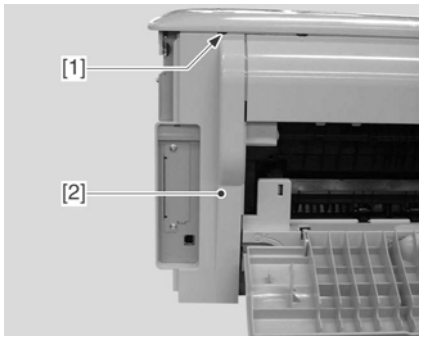
F-3-157

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



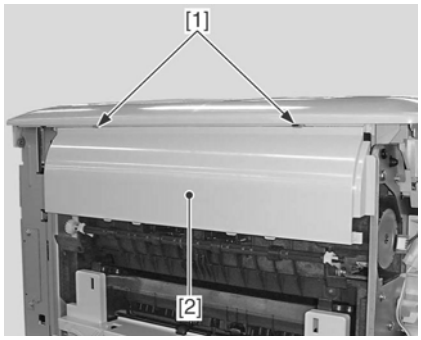
F-3-158

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



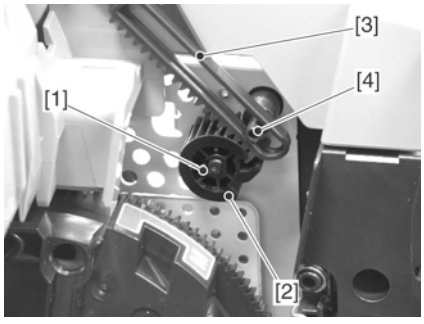
F-3-159

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



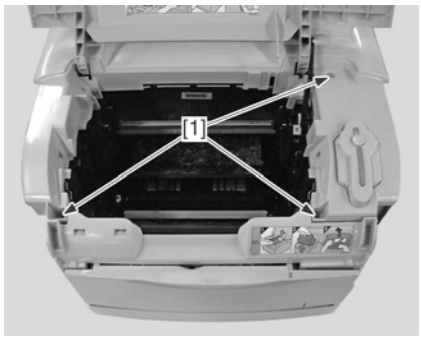
F-3-160

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



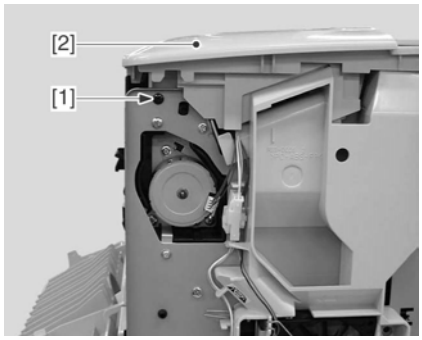
F-3-161

11) Remove the three screws [1].



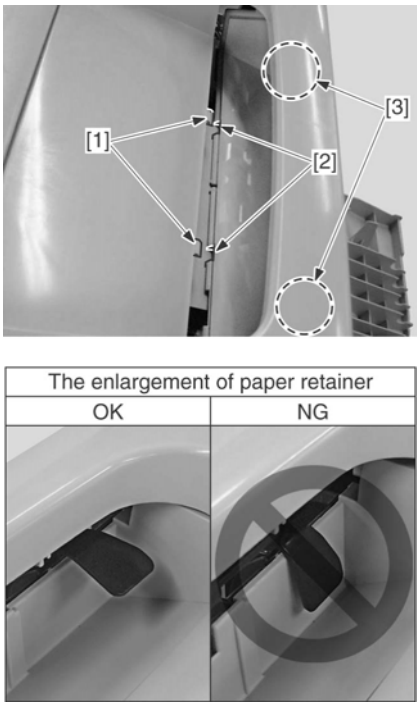
F-3-162

12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



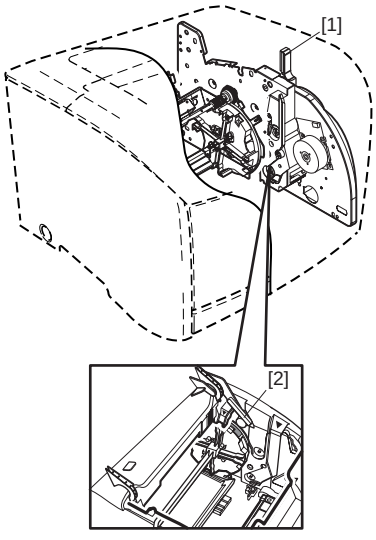
F-3-163

⚠
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.

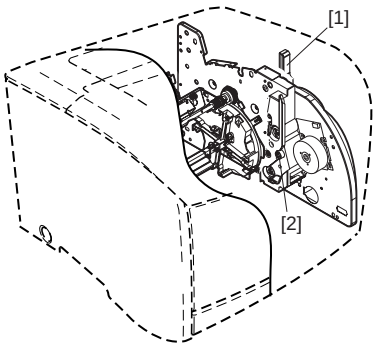


F-3-164

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-165

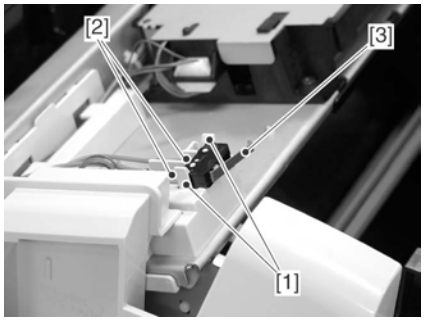


F-3-166

3.2.16.2 Removing the Door Open Detection Switch

0005-8948

1) Unhook the two claws [1] and disconnect the two contacts [2]. Remove the door open detection switch [3].



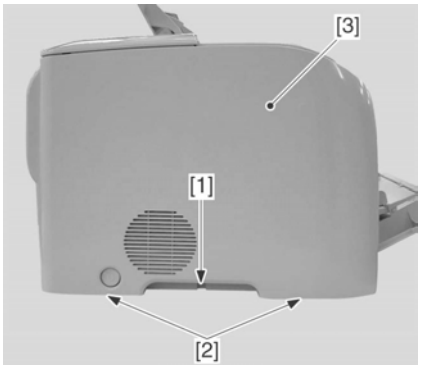
F-3-167

3.2.17 Cooling Fan

3.2.17.1 Removing the Upper Cover Unit

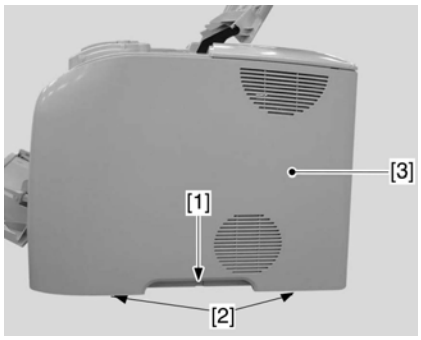
0007-8486

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



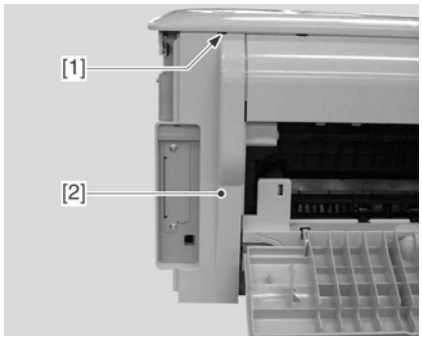
F-3-168

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



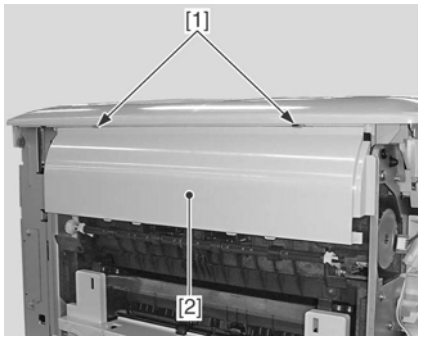
F-3-169

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



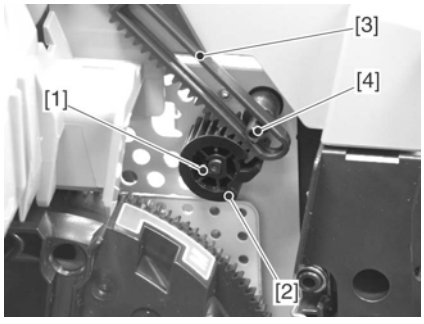
F-3-170

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



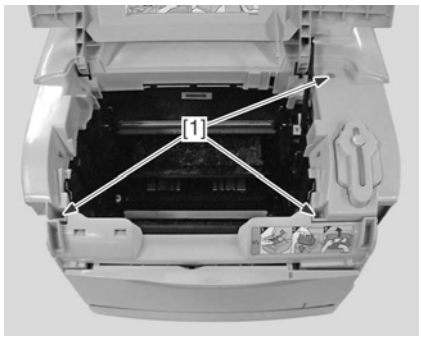
F-3-171

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



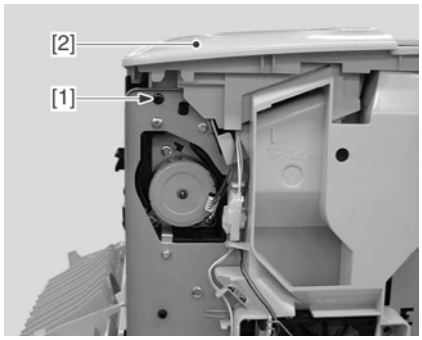
F-3-172

11) Remove the three screws [1].



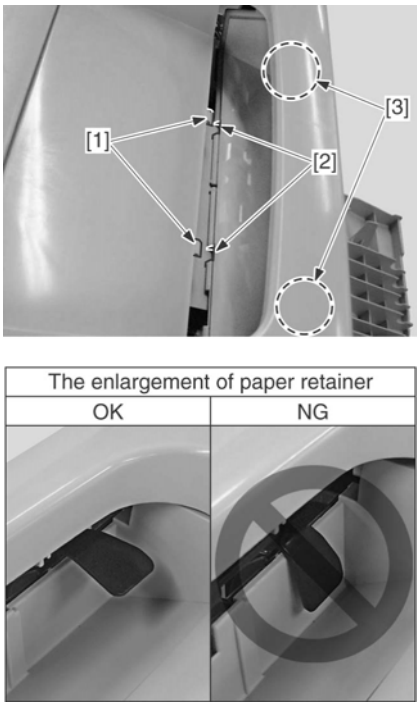
F-3-173

12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



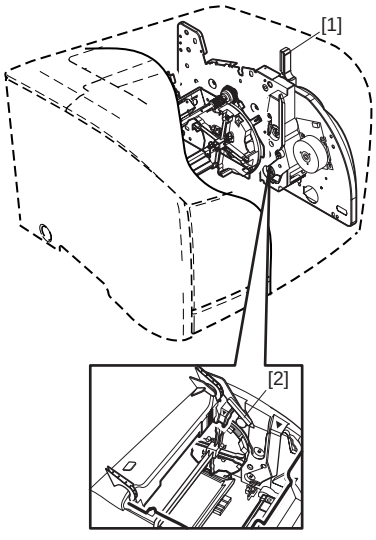
F-3-174

⚠
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.

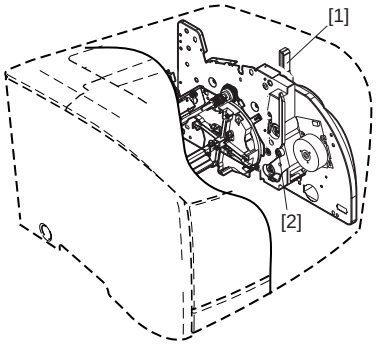


F-3-175

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-176

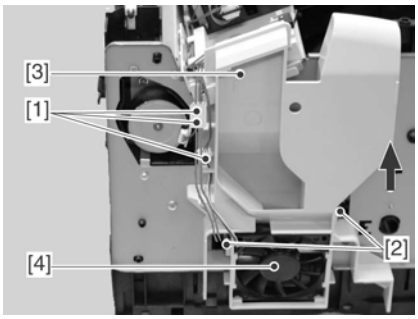


F-3-177

3.2.17.2 Removing the Cooling Fan

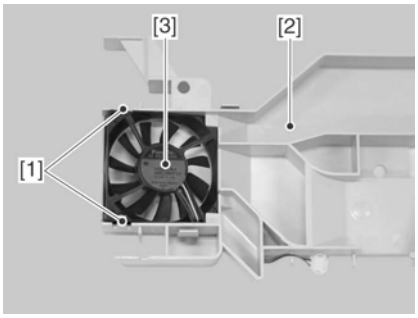
0005-8999

1) Disconnect the three connectors [1] and unhook the two claws [2].
2) Slide the fan duct [3] in the direction of the arrow. Remove the cooling fan [4] with the fan duct.



F-3-178

3) Unhook the two claws [1] and remove the cooling fan [3] from the fan duct [2].



F-3-179

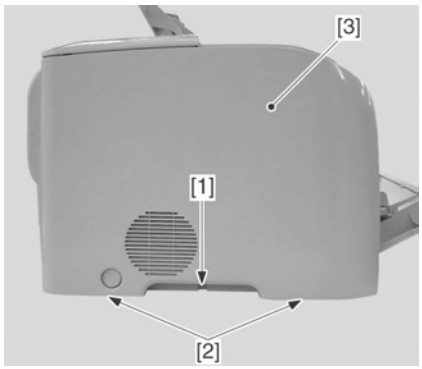
1. When installing the cooling fan, be sure that the inscribed arrow indicating the direction of the winds on the fan is facing inside.
2. The cooling fan is set next to the high-voltage cable. Be sure to turn OFF the power before replacing the cooling fan.

3.2.18 Internal Temperature Detection Thermistor

3.2.18.1 Removing the Upper Cover Unit

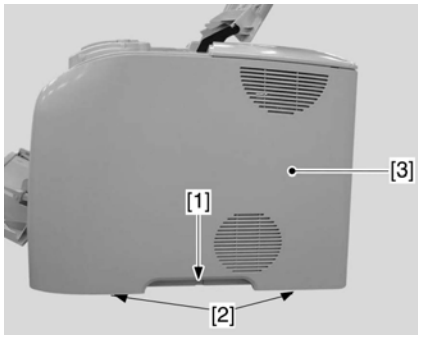
0007-8481

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



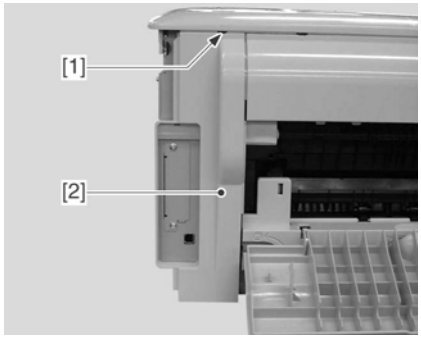
F-3-180

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



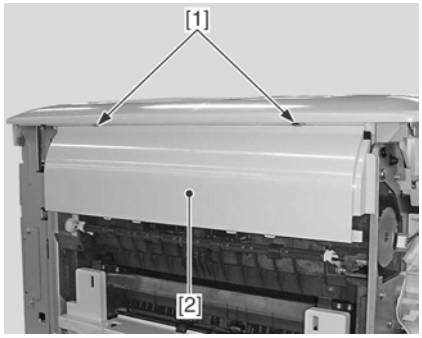
F-3-181

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



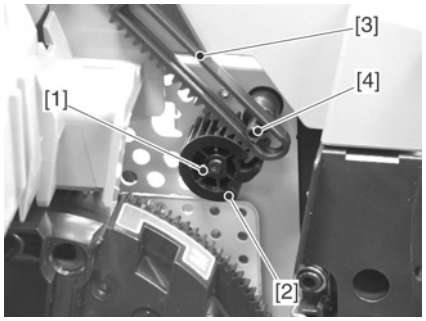
F-3-182

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



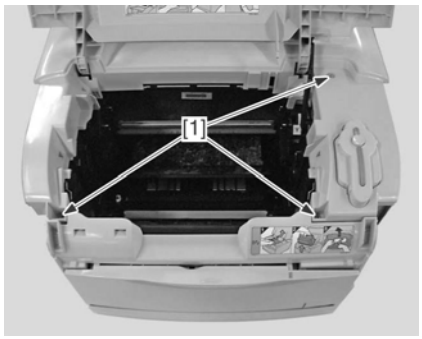
F-3-183

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



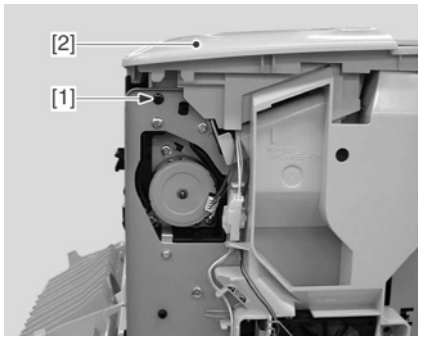
F-3-184

11) Remove the three screws [1].



F-3-185

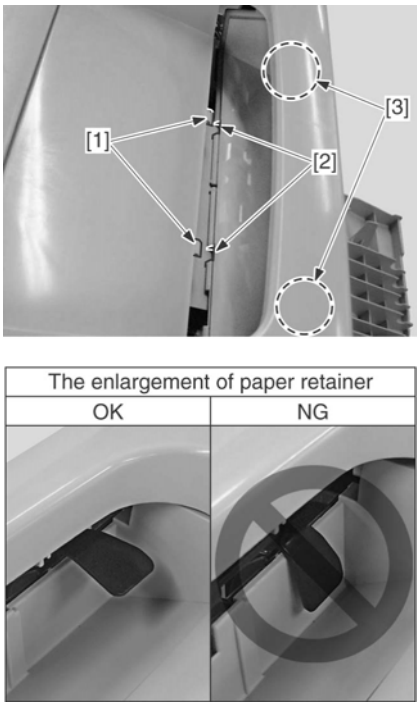
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-186

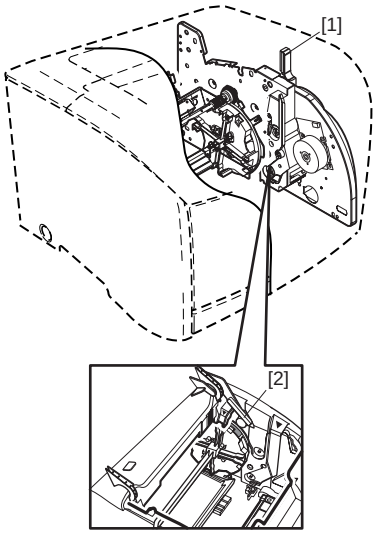
⚠

1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.

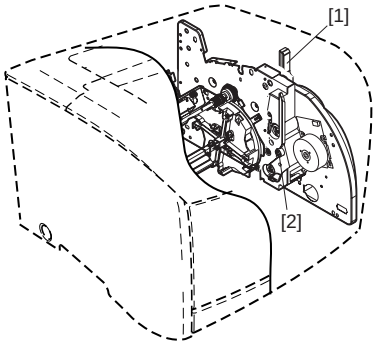


F-3-187

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-188

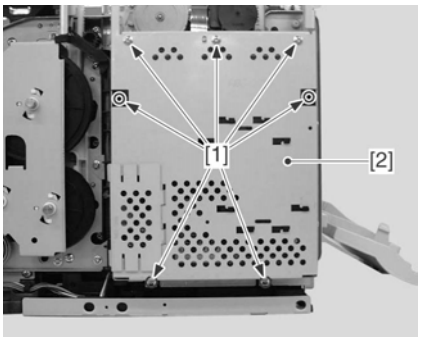


F-3-189

3.2.18.2 Removing the Video Controller PCB

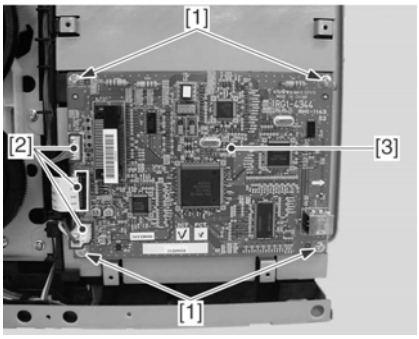
0007-8483

1) Remove the seven screws [1], and detach the shield cover.



F-3-190

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



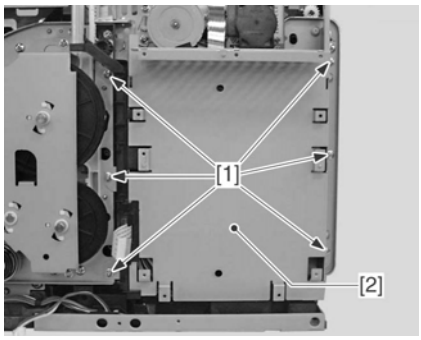
F-3-191

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.2.18.3 Removing the Internal Temperature Detection Thermistor

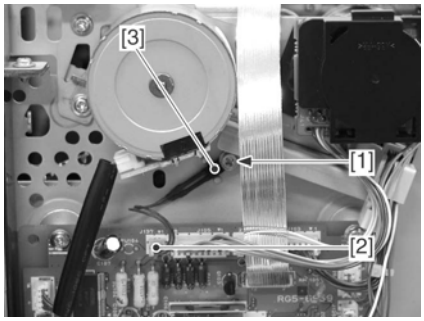
0005-8850

1) Remove the 6 screws [1], and detach the shield mount [2].



F-3-192

2) Remove the screw [1], Disconnect the connector [2] and remove the internal temparature detection thermistor [3].



F-3-193

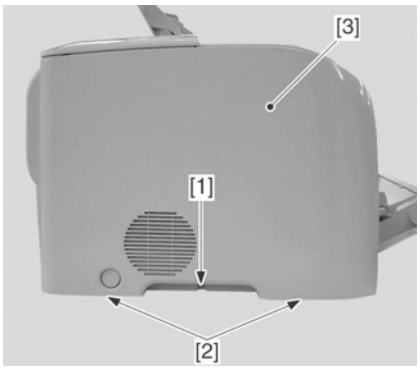
3.3 LASER EXPOSURE SYSTEM

3.3.1 Laser Scanner Unit

3.3.1.1 Removing the Upper Cover Unit

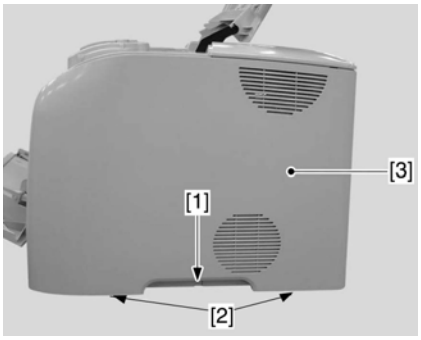
0007-8491

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



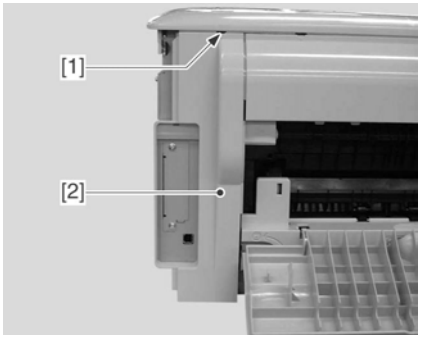
F-3-194

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



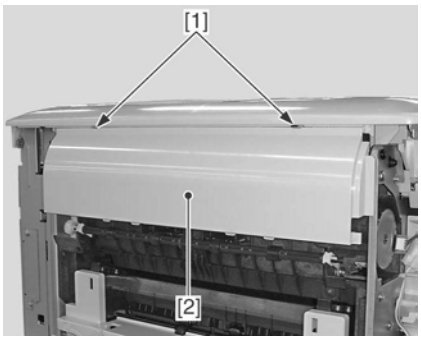
F-3-195

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



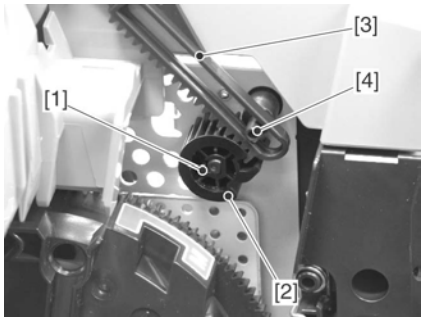
F-3-196

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



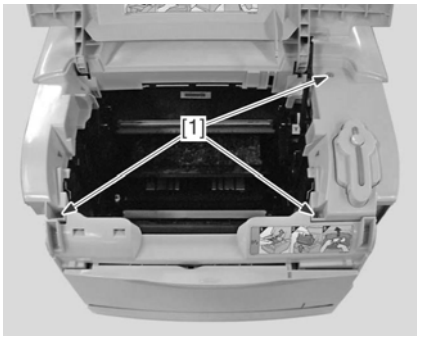
F-3-197

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



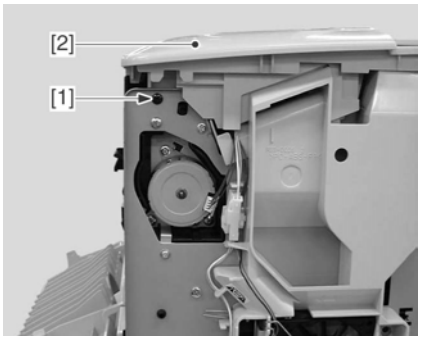
F-3-198

11) Remove the three screws [1].



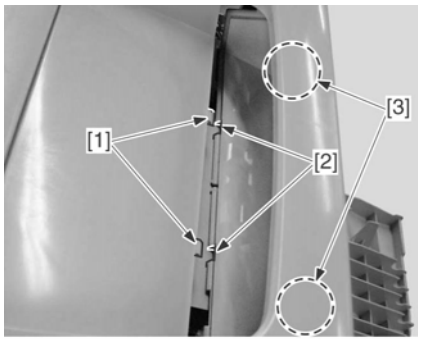
F-3-199

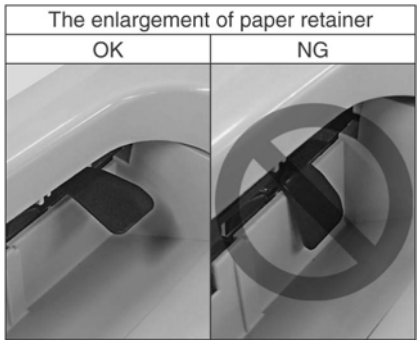
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-200

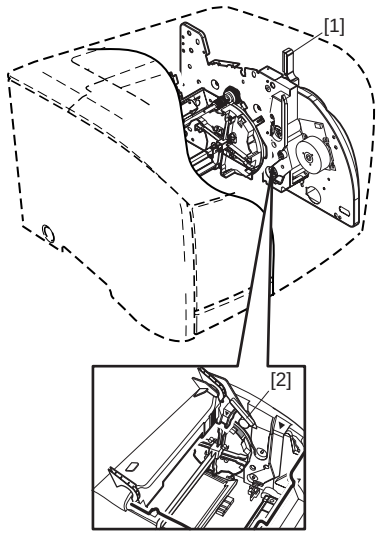
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



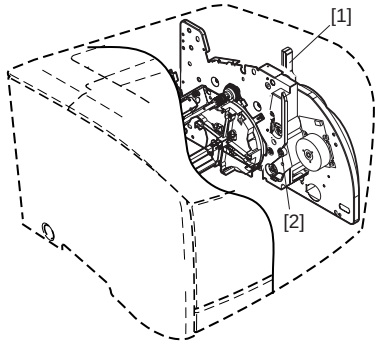


F-3-201

⚠
1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-202

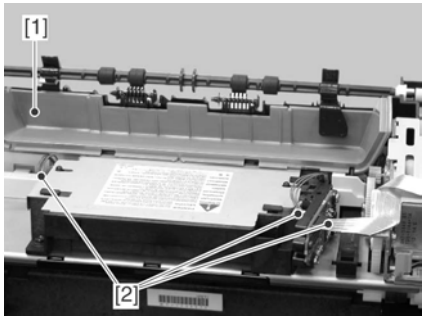


F-3-203

3.3.1.2 Removing the Laser/Scanner Unit

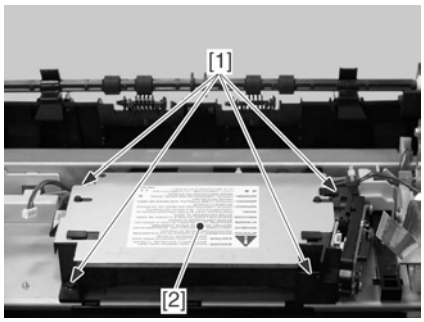
0005-8757

1) Remove the face-down sub tray [1].
2) Disconnect the three connectors [2].



F-3-204

3) Remove the four screws [1] and the laser/scanner unit [2].



F-3-205

The laser/scanner unit is not adjustable in the field. Be sure not to disassemble it. If you have replaced the laser/scanner unit, be sure to execute PWM adjustment in service mode. (For details, see p.4-40.)

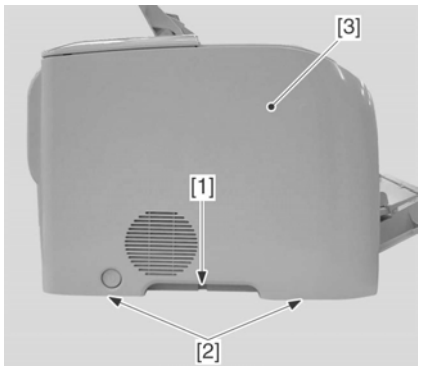
3.4 IMAGE FORMATION SYSTEM

3.4.1 Drum Cartridge Memory Tag Contact

3.4.1.1 Removing the Upper Cover Unit

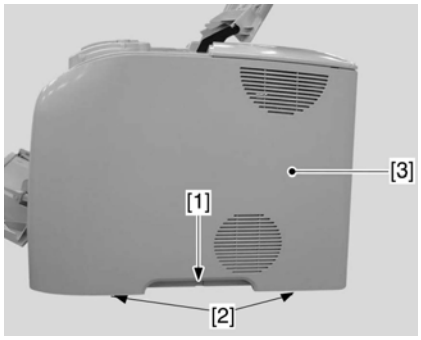
0007-8579

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



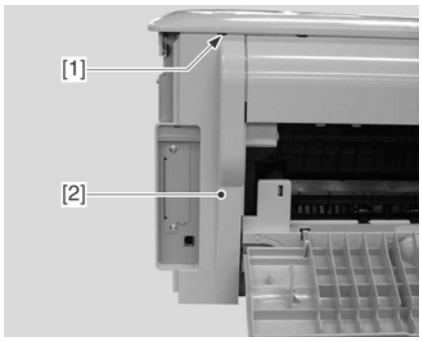
F-3-206

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



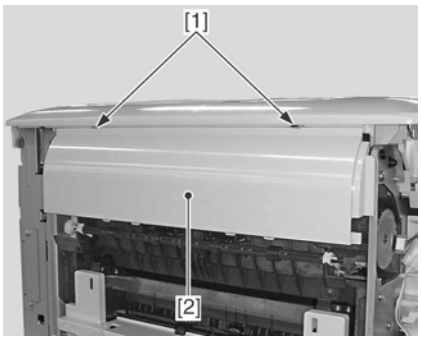
F-3-207

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



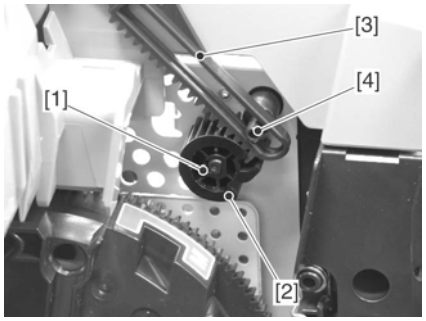
F-3-208

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



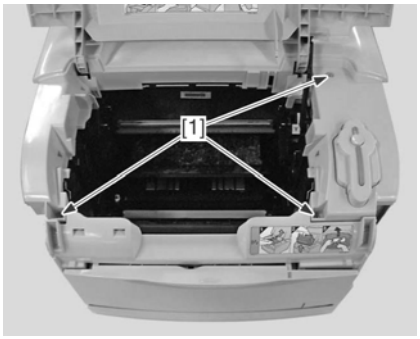
F-3-209

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



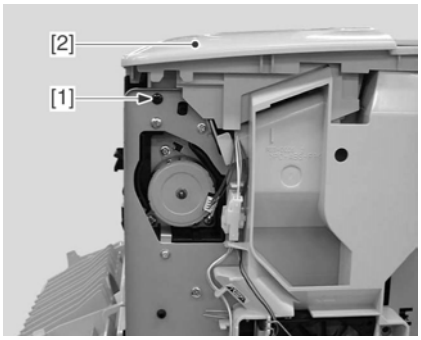
F-3-210

11) Remove the three screws [1].



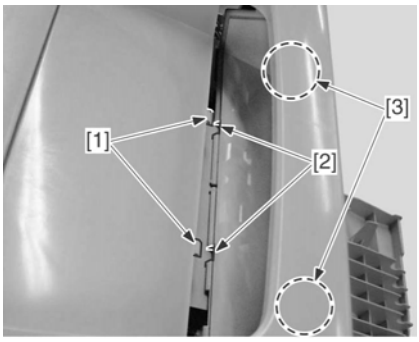
F-3-211

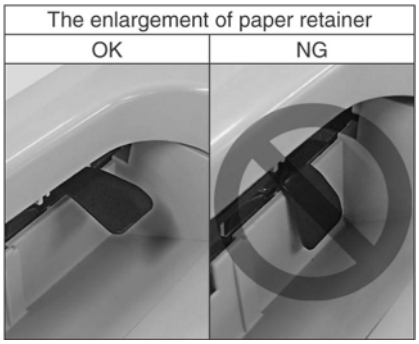
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-212

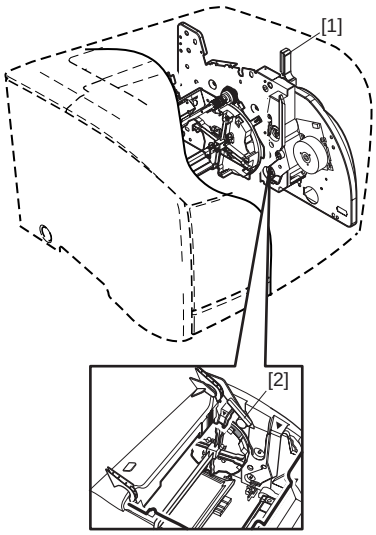
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



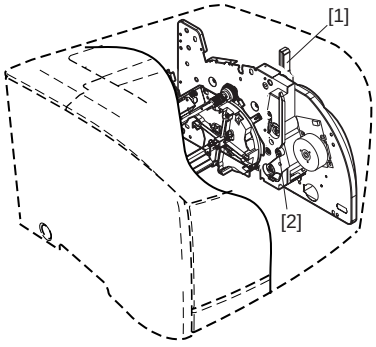


F-3-213

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-214

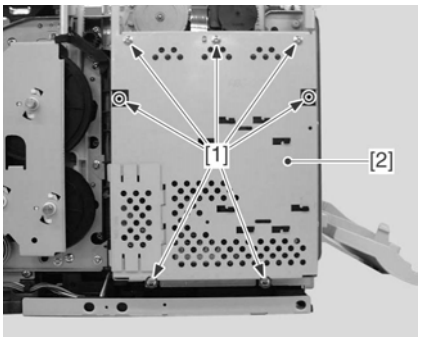


F-3-215

3.4.1.2 Removing the Video Controller PCB

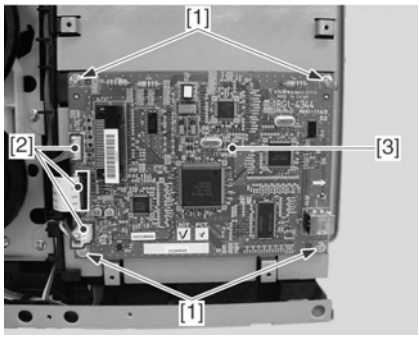
0007-8581

1) Remove the seven screws [1], and detach the shield cover.



F-3-216

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



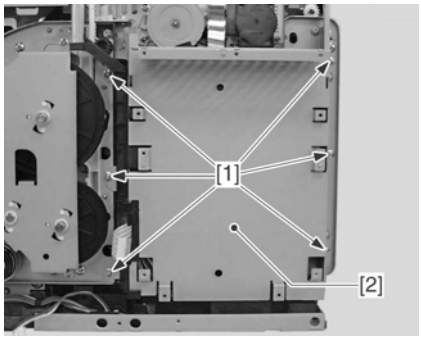
F-3-217

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.4.1.3 Removing the Drum Cartridge Memory Tag Contact

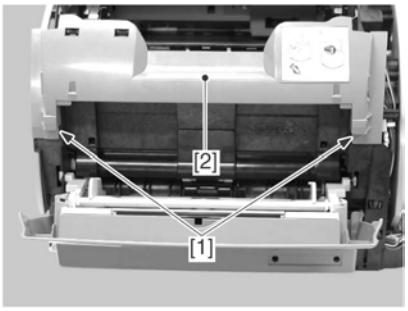
0005-8843

1) Remove the 6 screws [1], and detach the shield mount [2].



F-3-218

2) Unhook the 2 claws [1]. Remove the inner cover [2] from the printer by pulling the cover towards you.

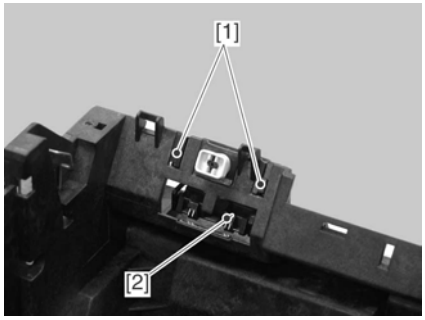


F-3-219

3) Disconnect the connector [1] on the DC controller PCB.

F-3-220

4) Unhook the two claws [1]. Remove the drum cartridge memory tag contact [2].



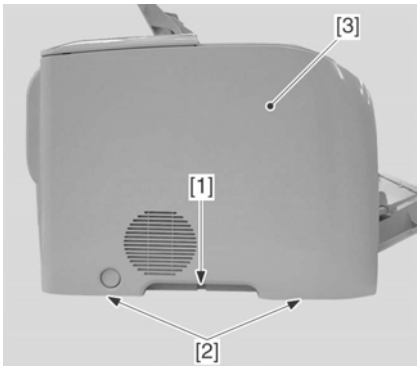
F-3-221

3.4.2 Developing Rotary Unit

3.4.2.1 Removing the Upper Cover Unit

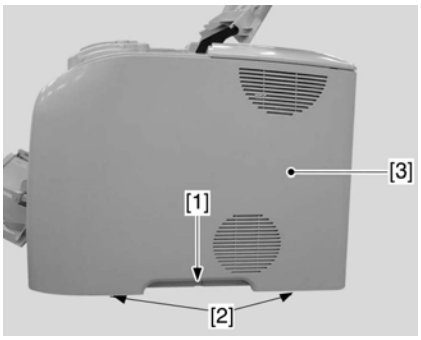
0007-8501

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



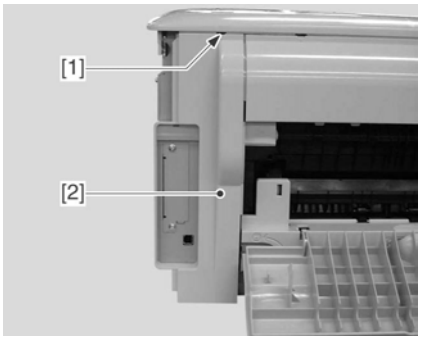
F-3-222

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



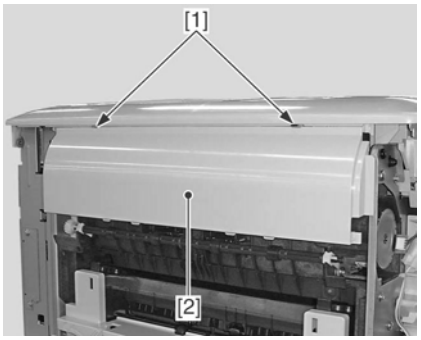
F-3-223

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



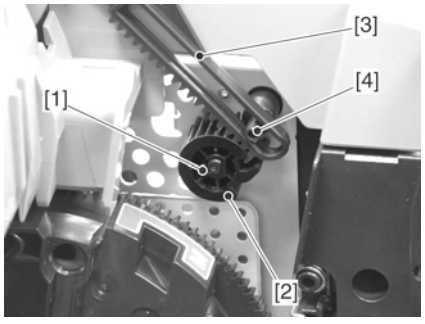
F-3-224

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



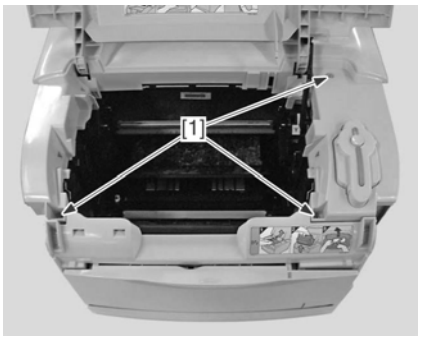
F-3-225

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



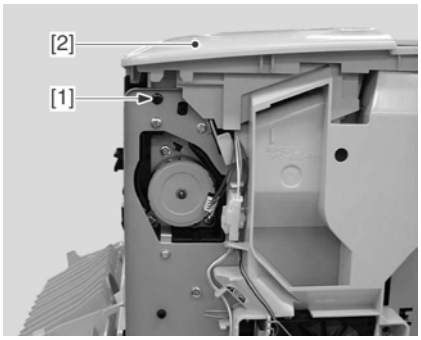
F-3-226

11) Remove the three screws [1].



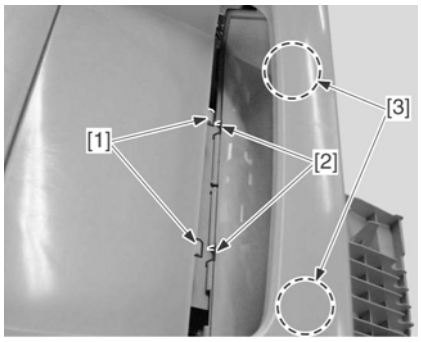
F-3-227

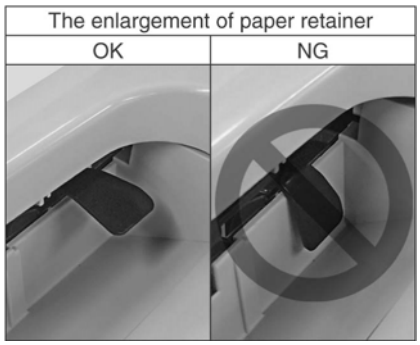
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-228

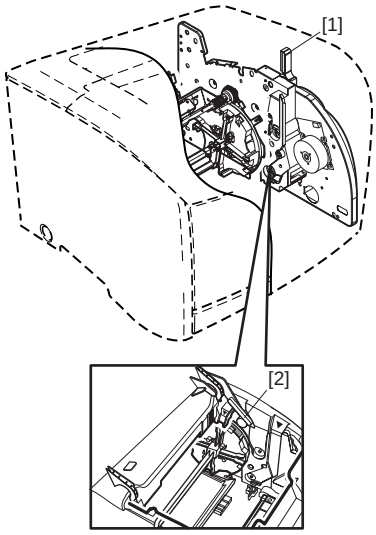
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



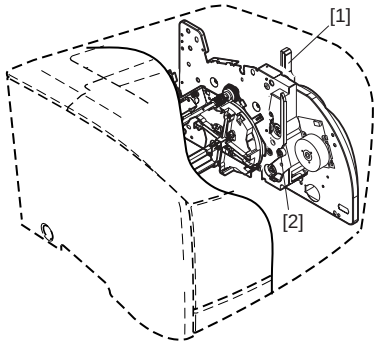


F-3-229

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-230

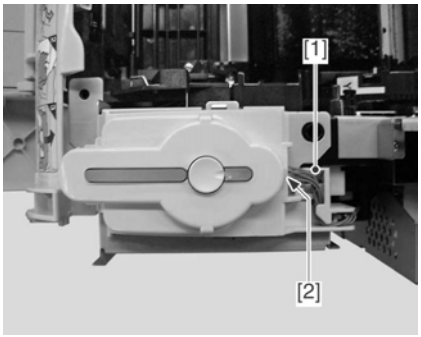


F-3-231

3.4.2.2 Removing the Control Panel

0007-8502

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

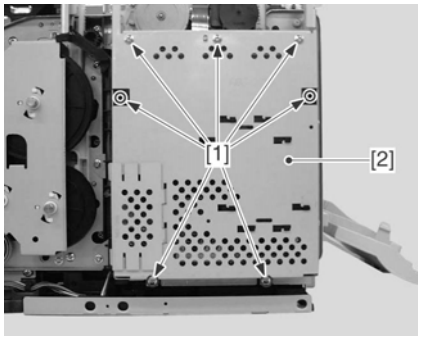


F-3-232

3.4.2.3 Removing the Video Controller PCB

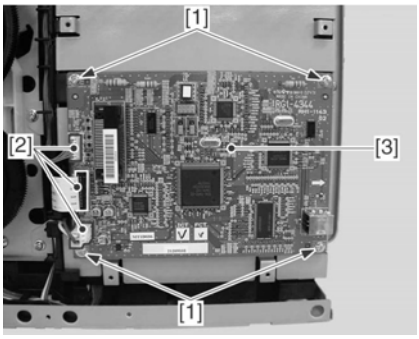
0007-8503

1) Remove the seven screws [1], and detach the shield cover.



F-3-233

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



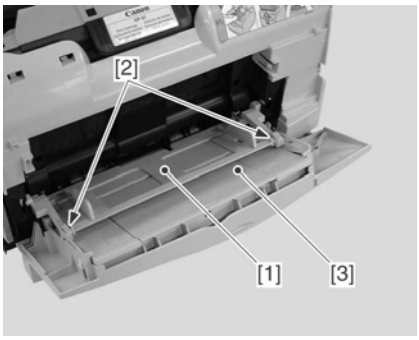
F-3-234

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.4.2.4 Removing the Front Cover Unit

0007-8504

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

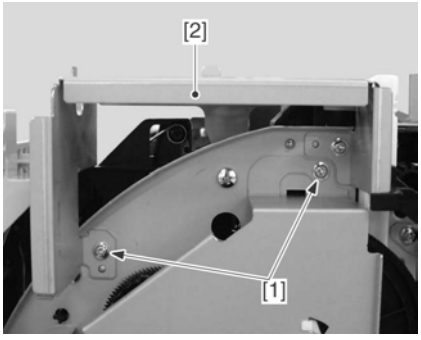


F-3-235

3.4.2.5 Removing the Main Drive Unit

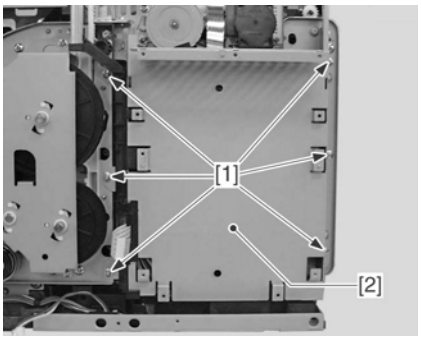
0007-8505

1) Remove the 2 screws [1], and detach the control panel mount [2].



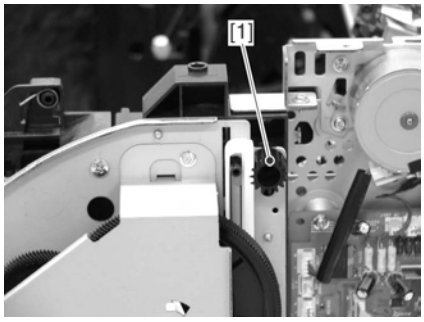
F-3-236

2) Remove the 6 screws [1], and detach the shield mount [2].



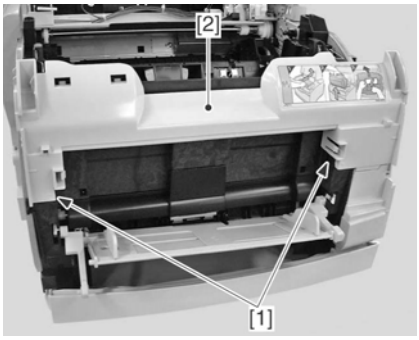
F-3-237

3) Remove the 18T gear [1].



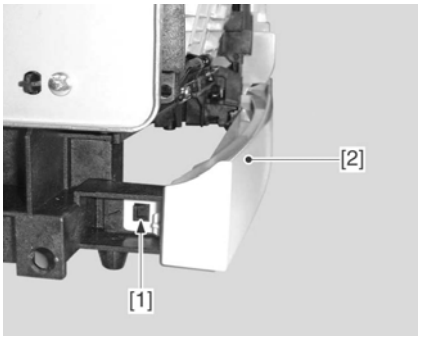
F-3-238

4) Free the 2 claws [1], and detach the inside cover [2].



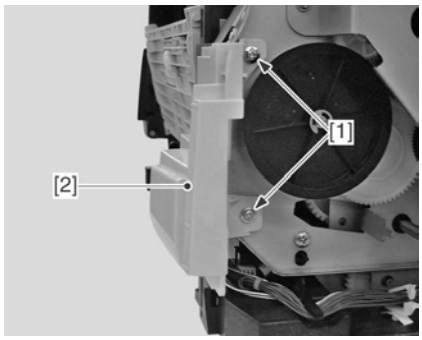
F-3-239

5) Free the claw [1], and detach the lower front cover [2].



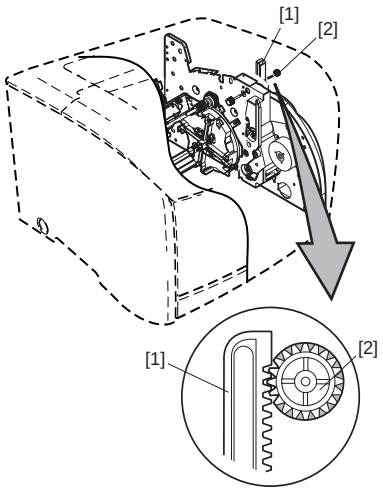
F-3-240

6) Remove the 2 screws [1], and detach the front auxiliary cover [2].



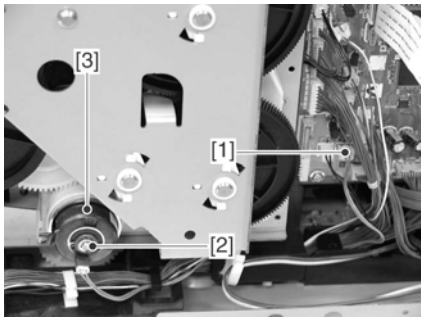
F-3-241

⚠ When installing the main drive unit, be sure to pull up the drive release lever [1] (drive release status) before installing the 18T gear [2] as shown in the figure right side.
Note that the 18T gear may not engage with the drive release lever if the gear is not placed properly.



F-3-242

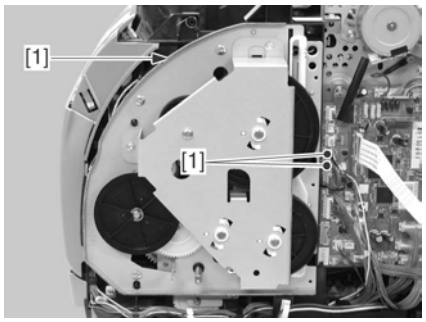
7) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



F-3-243

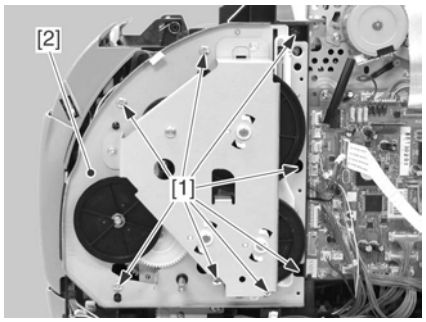
⚠ The connector on the registration clutch side cannot be disconnected. When removing the registration clutch, be sure to disconnect the connector on the DC controller PCB (J113).

8) Disconnect the three connectors [1].



F-3-244

9) Remove the eight screws [1] and the main drive unit [2].

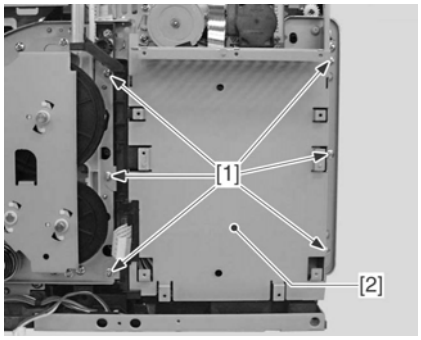


F-3-245

3.4.2.6 Removing Rotary Drive Unit

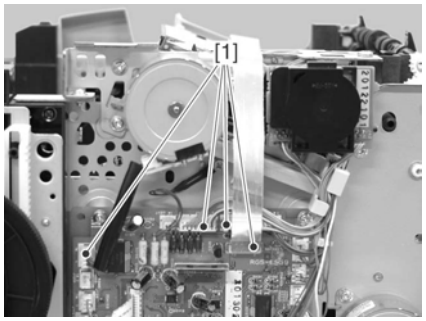
0007-8506

1) Remove the 6 screws [1], and detach the shield mount [2].



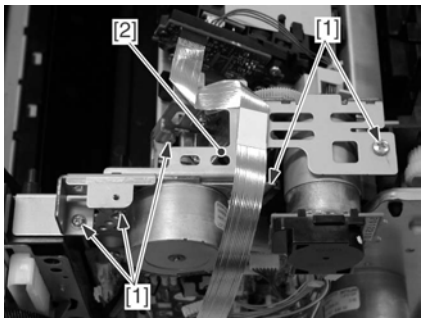
F-3-246

2) Disconnect the four connectors [1].



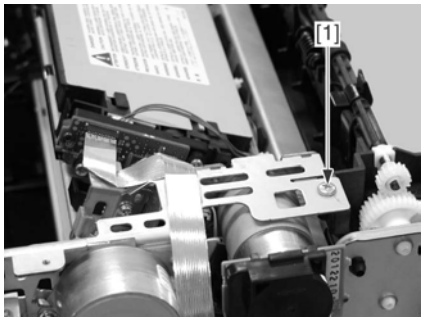
F-3-247

3) Remove the five screws [1] and the rotary drive unit [2].



F-3-248

⚠ The self-tapping screw [1] used for installing the rotary drive unit must be screwed the last.

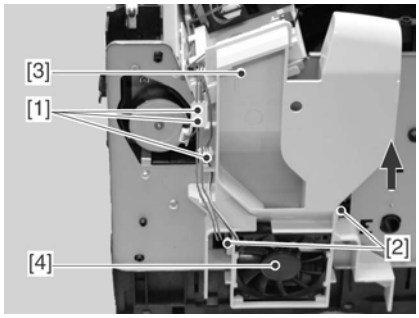


F-3-249

3.4.2.7 Removing the Developing Rotary Unit

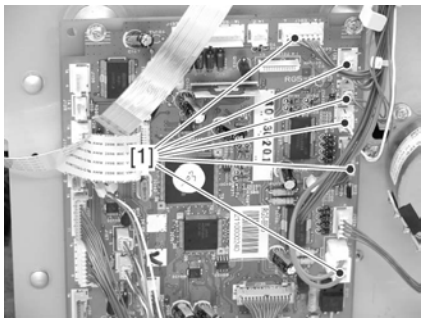
0005-8809

1) Disconnect the three connectors [1] and unhook the two claws [2].
2) Slide the fan duct [3] in the direction of the arrow. Remove the cooling fan [4] with the fan duct.



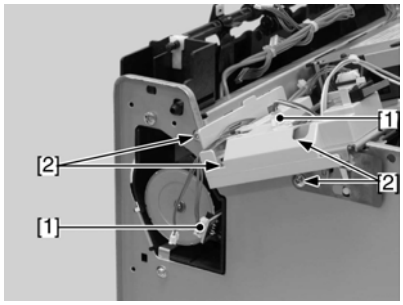
F-3-250

3) Disconnect the six connectors [1].



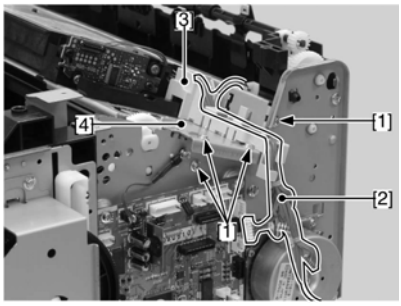
F-3-251

4) Disconnect the two connectors [1].
5) Remove the two screws [2].



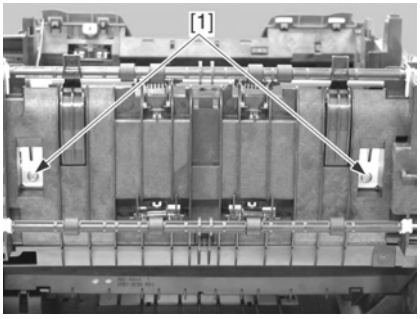
F-3-252

6) Remove the four screws [1].
7) Free the cable [2] from the cable guide [3]; then, detach the reinforcing plate [4].



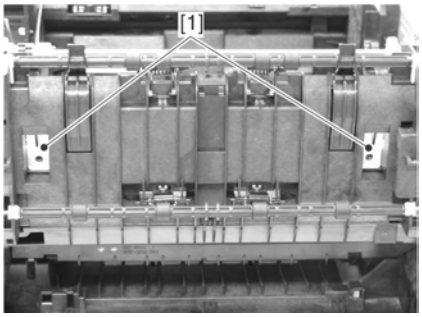
F-3-253

8) Remove the two screws [1].



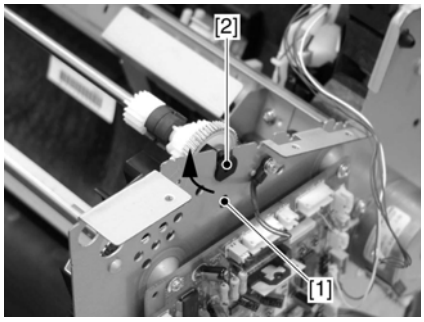
F-3-254

9) Press the upper areas of the two rotary holders with a screwdriver inward and make sure that the rotary holders [1] are removed from the printer.



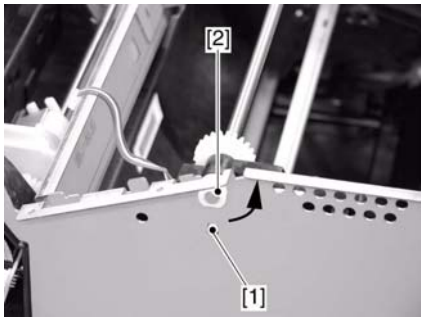
F-3-255

10) While pushing on the boss [1], rotate the rotary releasing lever (left) [2] in the direction of the arrow.



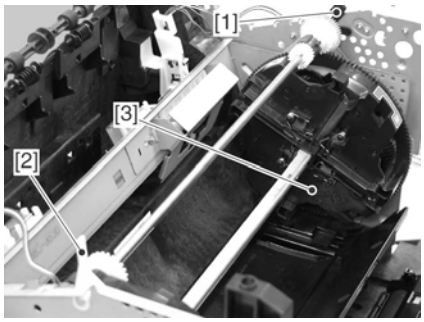
F-3-256

11) While pushing on the boss [1], rotate the rotary releasing lever (right) [2] in the direction of the arrow.



F-3-257

12) Lift up the developing rotary unit [3] in a horizontal position as holding the rotary release levers (right [2] and left [1]). Remove the unit.



F-3-258

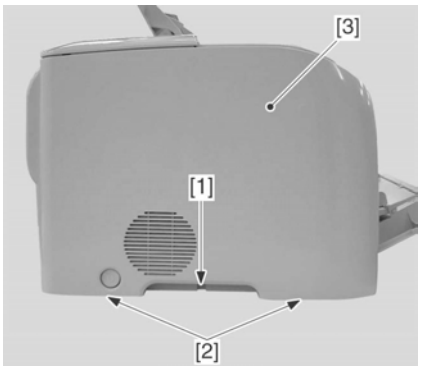
When installing the developing rotary unit, be sure to check that the 2 leading edges of rotary holders are set on the flame of the printer.

3.4.3 Developing Rotary Motor

3.4.3.1 Removing the Upper Cover Unit

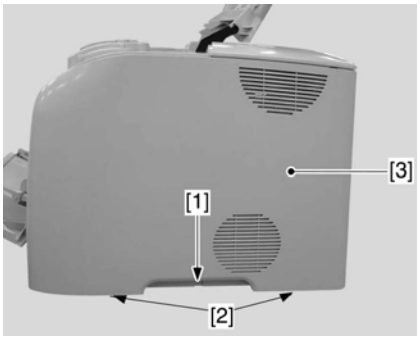
0007-8529

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



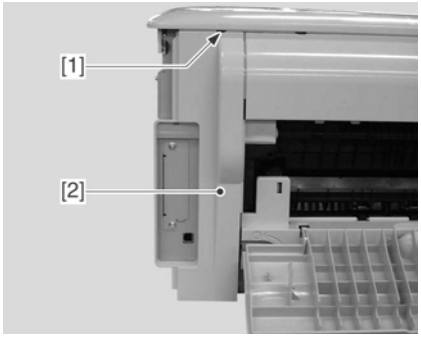
F-3-259

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



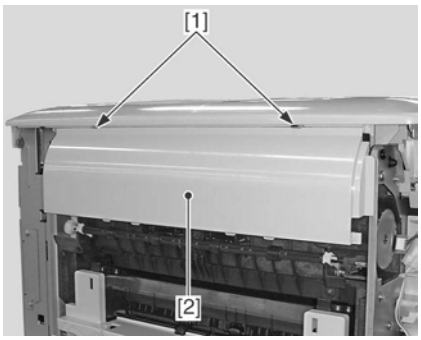
F-3-260

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



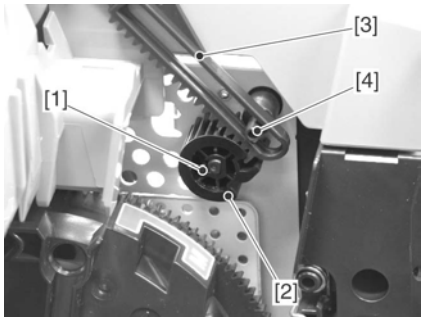
F-3-261

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



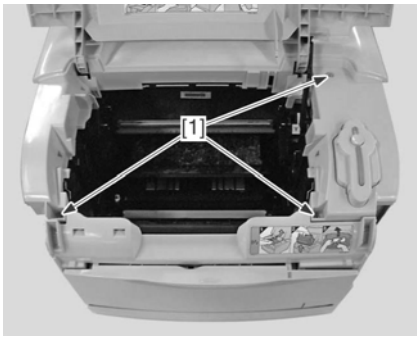
F-3-262

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



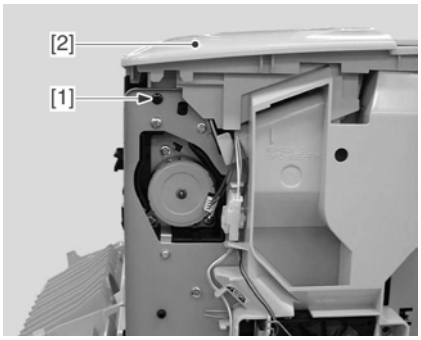
F-3-263

11) Remove the three screws [1].



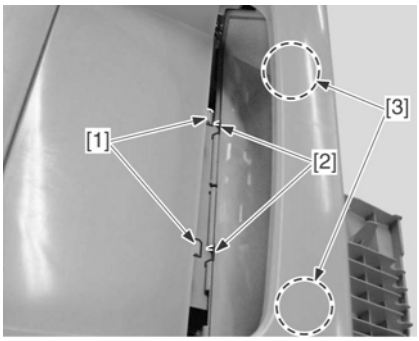
F-3-264

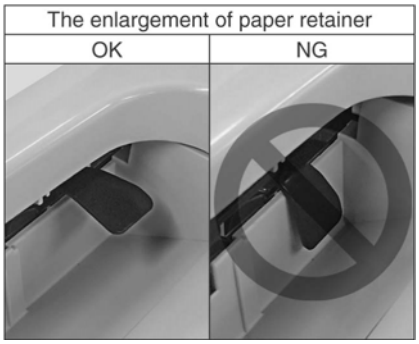
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-265

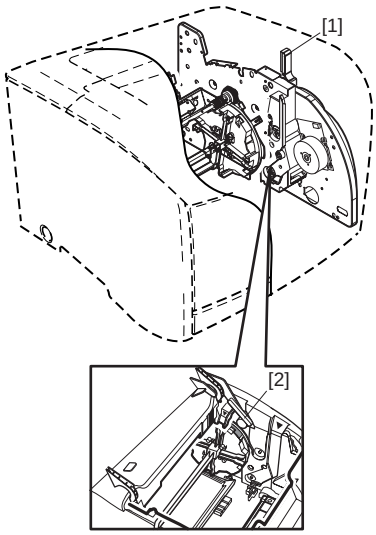
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



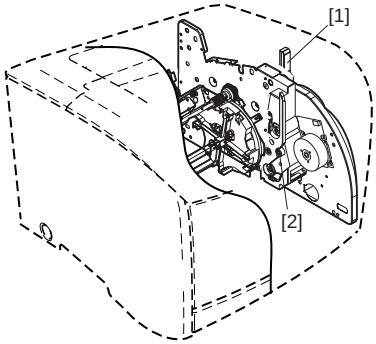


F-3-266

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-267

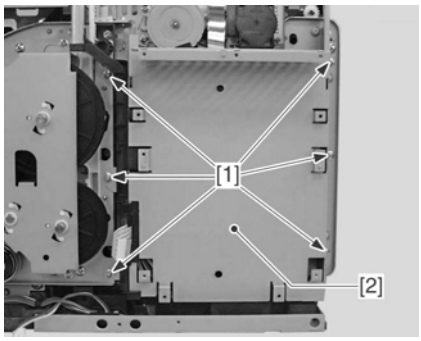


F-3-268

3.4.3.2 Removing the Rotary Drive Unit

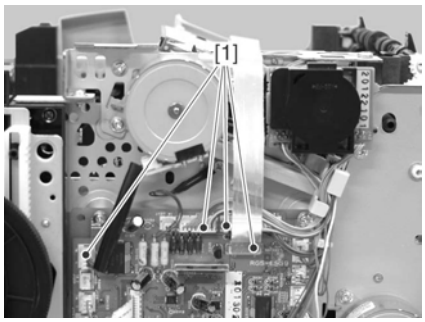
0007-8530

1) Remove the 6 screws [1], and detach the shield mount [2].



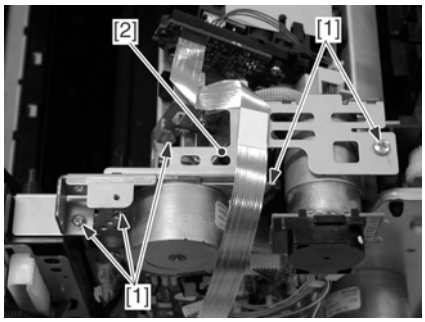
F-3-269

2) Disconnect the four connectors [1].



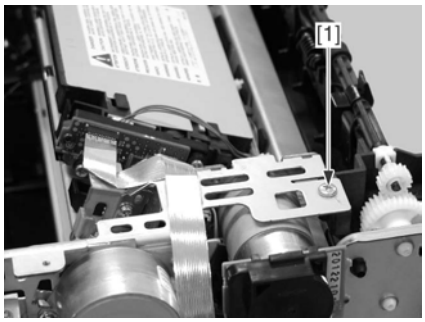
F-3-270

3) Remove the five screws [1] and the rotary drive unit [2].



F-3-271

⚠ The self-tapping screw [1] used for installing the rotary drive unit must be screwed the last.

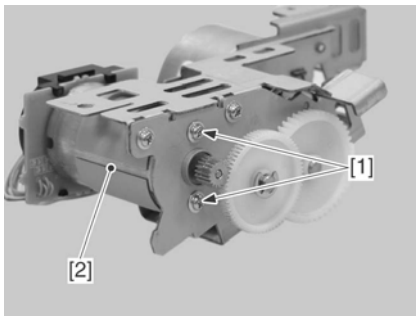


F-3-272

3.4.3.3 Removing the Developing Rotary Motor

0005-8995

1) Remove the two screws [1] and the developing rotary motor [2] from the rotary drive unit.



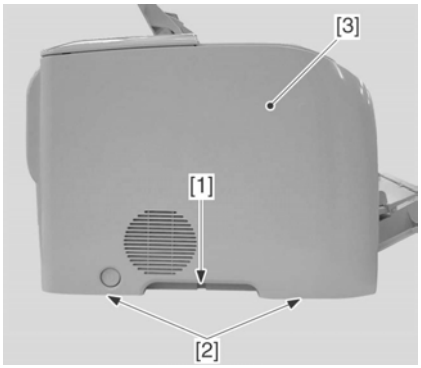
F-3-273

3.4.4 Developing Rotary Stopper Solenoid

3.4.4.1 Removing the Upper Cover Unit

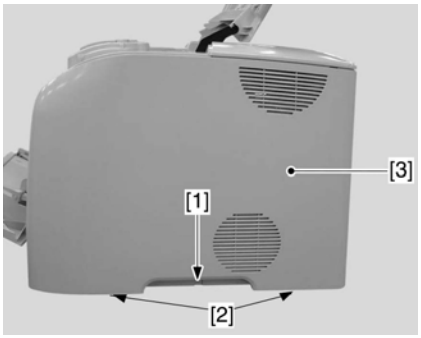
0007-8519

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



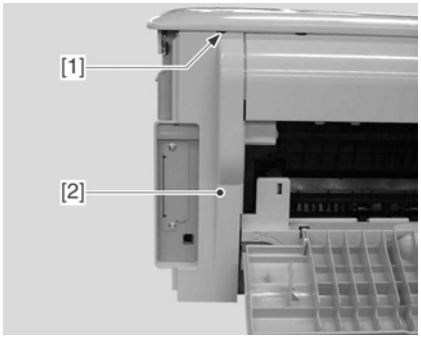
F-3-274

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



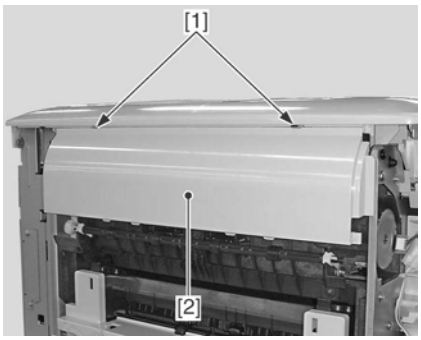
F-3-275

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



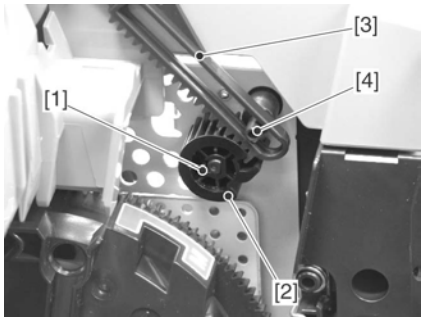
F-3-276

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



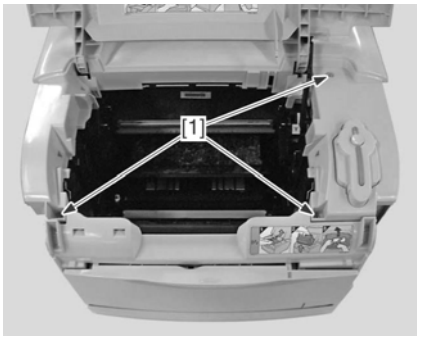
F-3-277

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



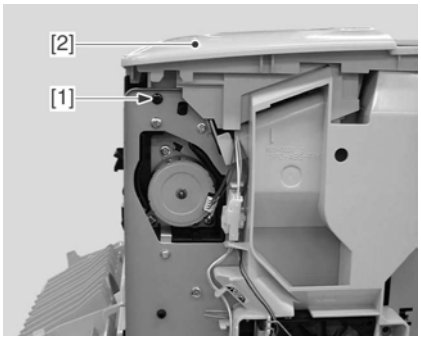
F-3-278

11) Remove the three screws [1].



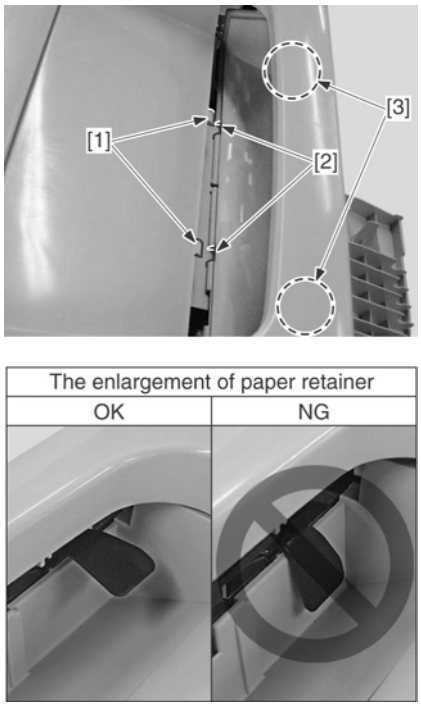
F-3-279

12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



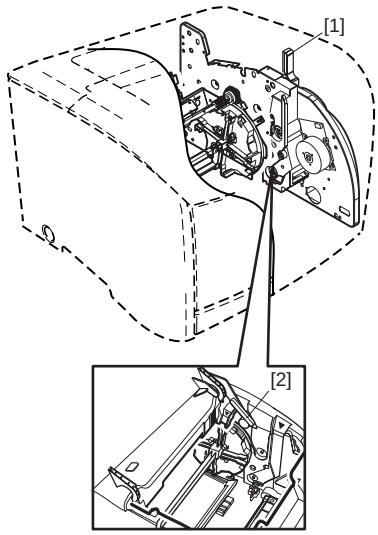
F-3-280

1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.

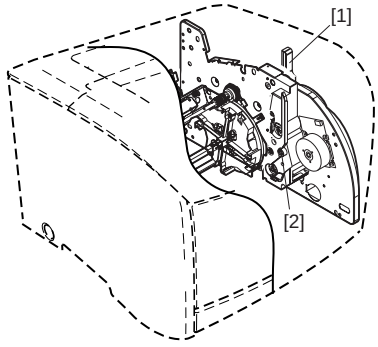


F-3-281

⚠
1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-282

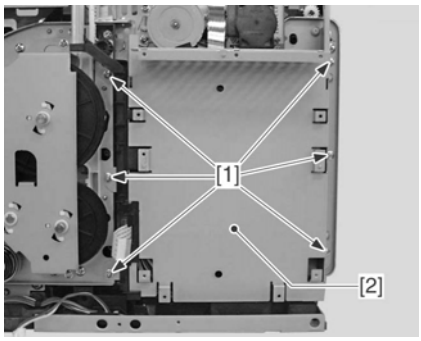


F-3-283

3.4.4.2 Removing Rotary Drive Unit

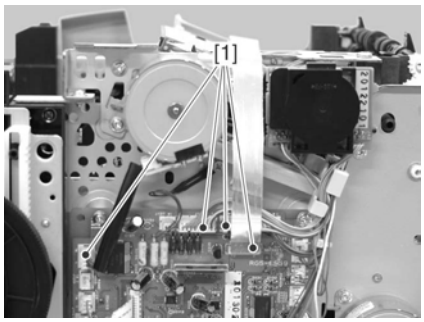
0007-8521

1) Remove the 6 screws [1], and detach the shield mount [2].



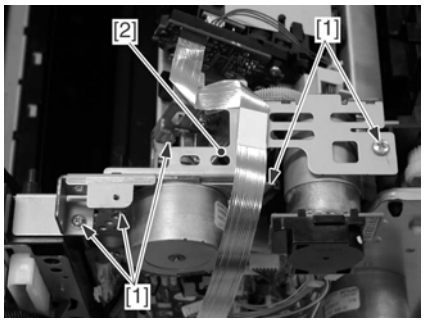
F-3-284

2) Disconnect the four connectors [1].



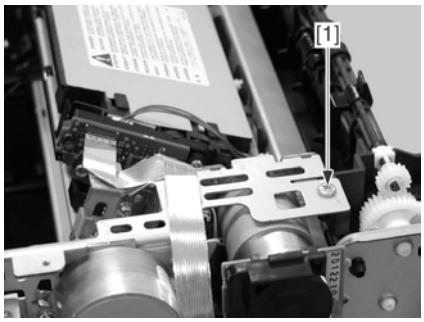
F-3-285

3) Remove the five screws [1] and the rotary drive unit [2].



F-3-286

⚠ The self-tapping screw [1] used for installing the rotary drive unit must be screwed the last.

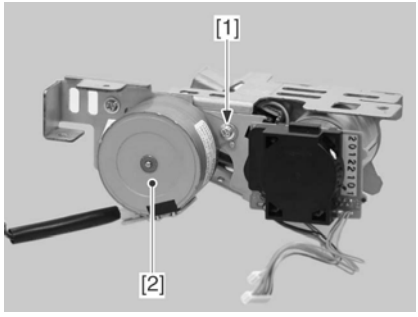


F-3-287

3.4.4.3 Removing the Toner Cartridge Motor

0007-8525

1) Remove the screw [1] and remove the toner cartridge motor [2].

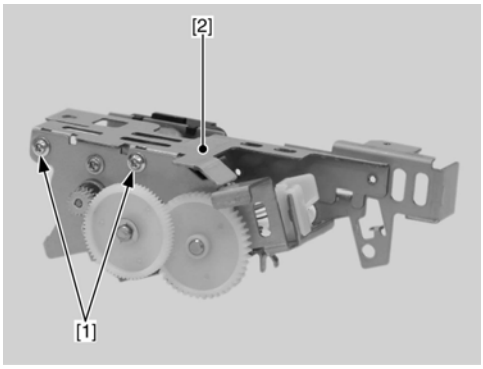


F-3-288

3.4.4.4 Removing the Developing Rotary Stopper Solenoid

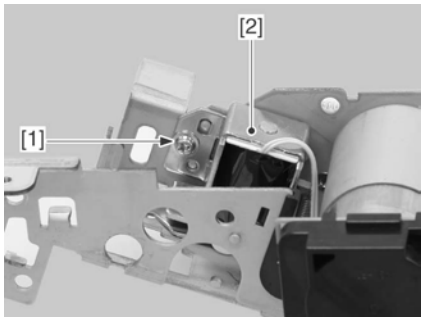
0005-8989

1) Remove the 2 screws [2], and detach the motor base [2] for the rotary drive assembly.



F-3-289

2) Remove the screw [1] and the developing rotary stopper solenoid [2] from the rotary drive unit.



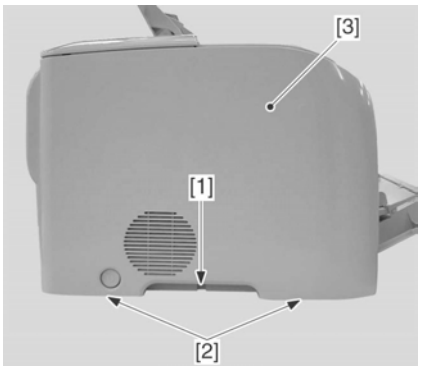
F-3-290

3.4.5 Developing Rotary/Toner Level Detection PCB

3.4.5.1 Removing the Upper Cover Unit

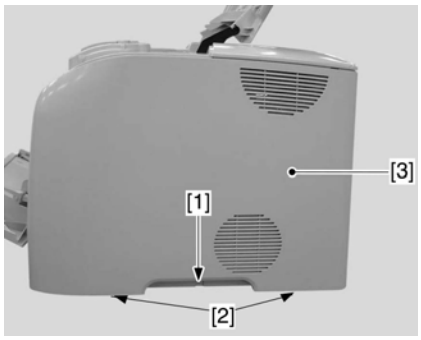
0007-8628

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



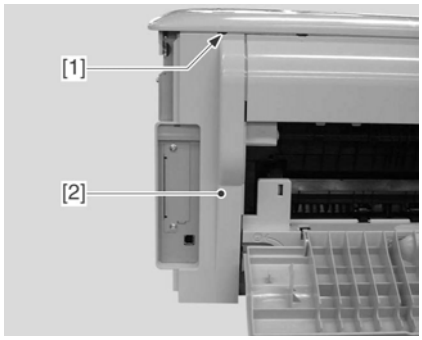
F-3-291

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



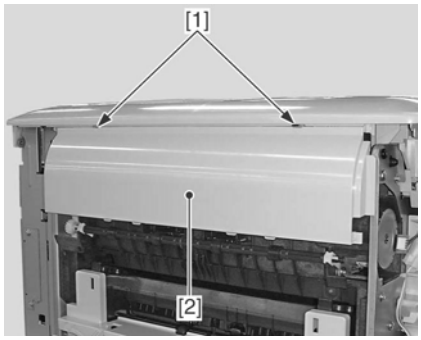
F-3-292

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



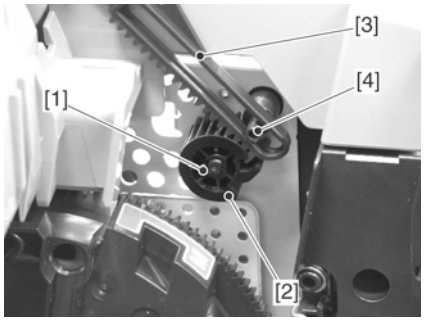
F-3-293

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



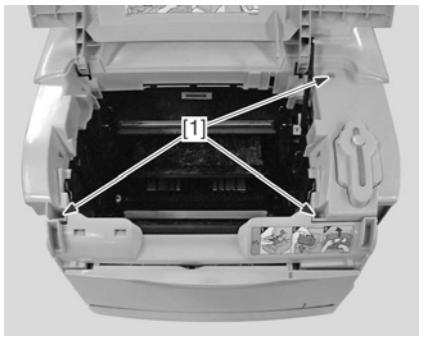
F-3-294

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



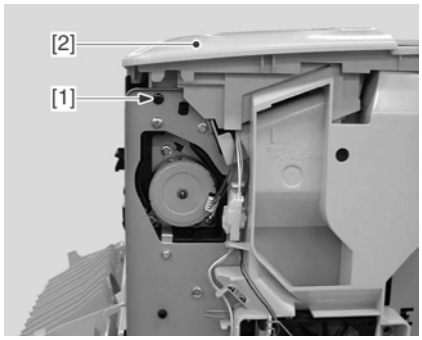
F-3-295

11) Remove the three screws [1].



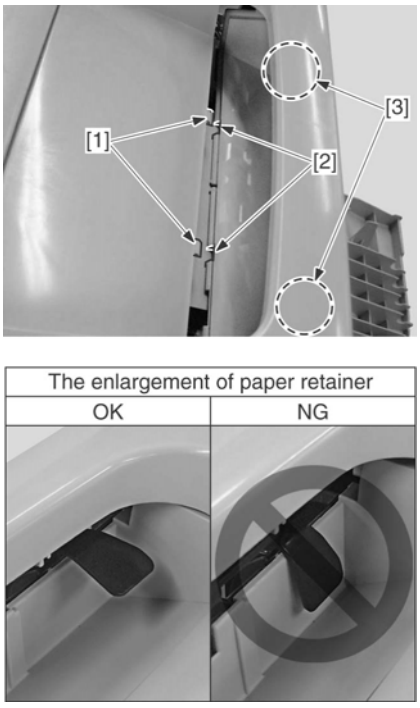
F-3-296

12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



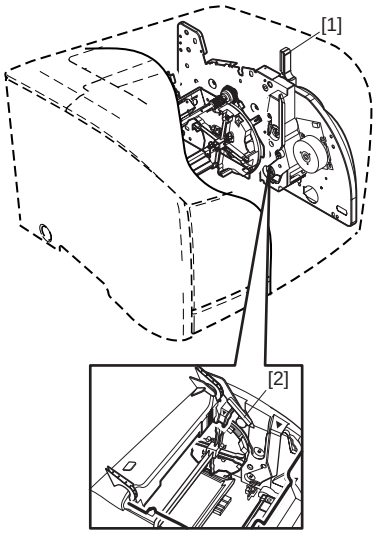
F-3-297

⚠
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.

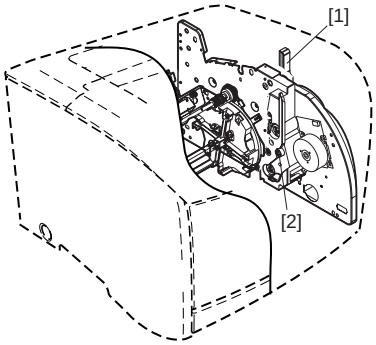


F-3-298

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-299

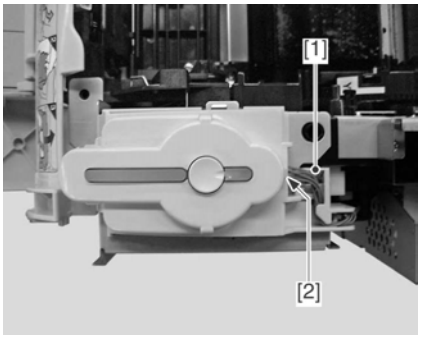


F-3-300

3.4.5.2 Removing the Control Panel

0007-8631

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

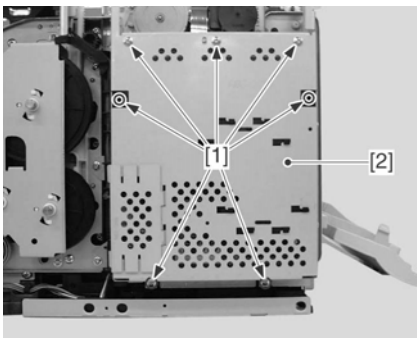


F-3-301

3.4.5.3 Removing the Video Controller PCB

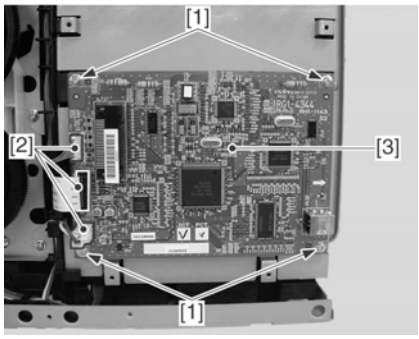
0007-8632

1) Remove the seven screws [1], and detach the shield cover.



F-3-302

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



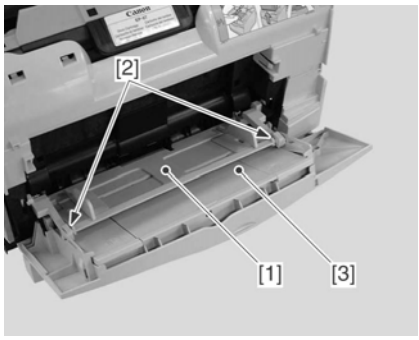
F-3-303

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.4.5.4 Removing the Front Cover Unit

0007-8633

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

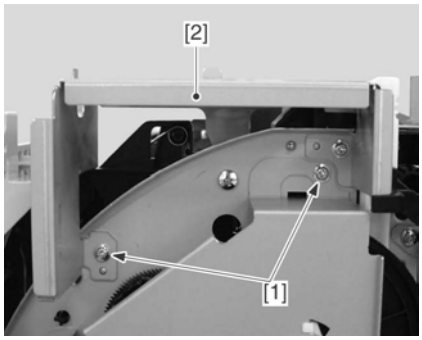


F-3-304

3.4.5.5 Removing the Main Drive Unit

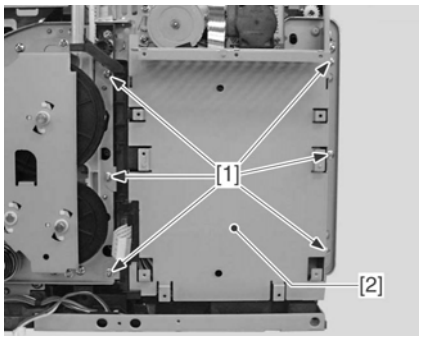
0007-8634

1) Remove the 2 screws [1], and detach the control panel mount [2].



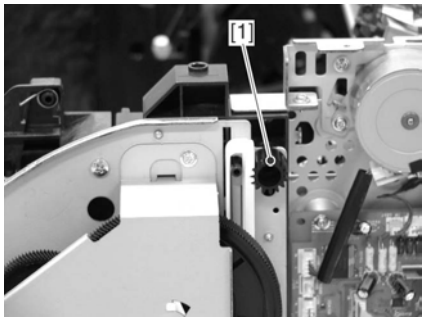
F-3-305

2) Remove the 6 screws [1], and detach the shield mount [2].



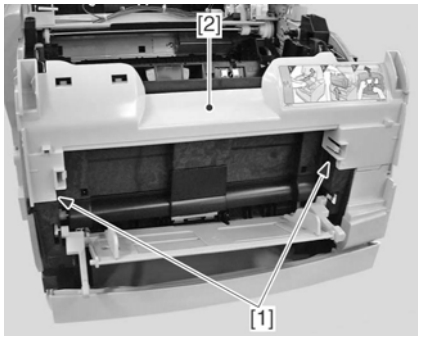
F-3-306

3) Remove the 18T gear [1].



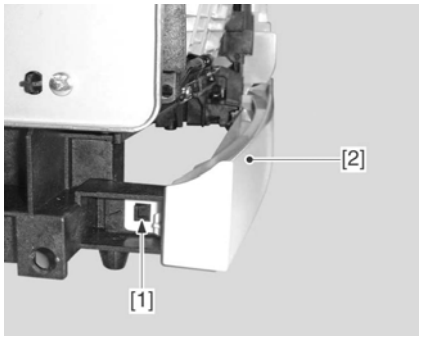
F-3-307

4) Free the 2 claws [1], and detach the inside cover [2].



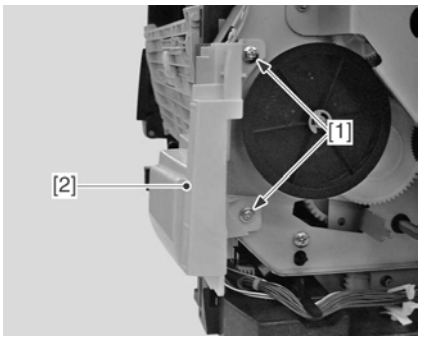
F-3-308

5) Free the claw [1], and detach the lower front cover [2].



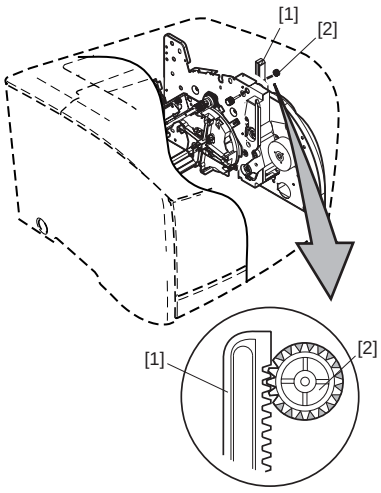
F-3-309

6) Remove the 2 screws [1], and detach the front auxiliary cover [2].



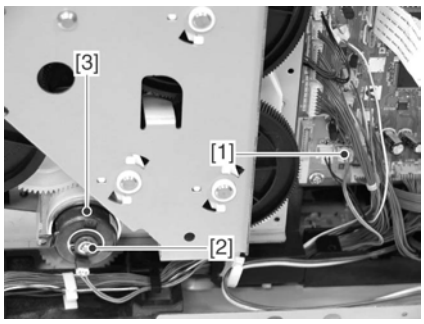
F-3-310

When installing the main drive unit, be sure to pull up the drive release lever [1] (drive release status) before installing the 18T gear [2] as shown in the figure right side.
Note that the 18T gear may not engage with the drive release lever if the gear is not placed properly.



F-3-311

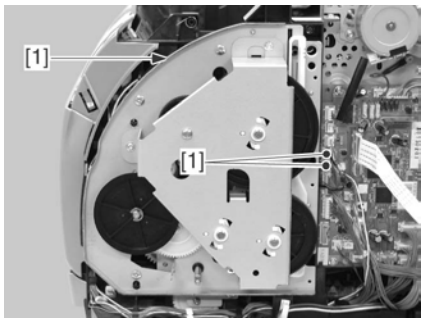
7) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



F-3-312

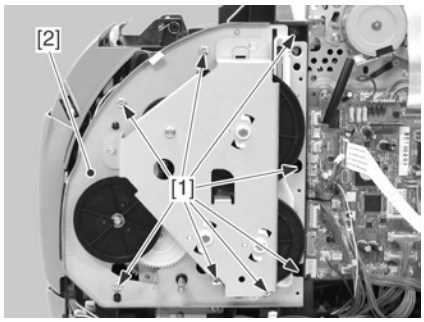
The connector on the registration clutch side cannot be disconnected. When removing the registration clutch, be sure to disconnect the connector on the DC controller PCB (J113).

8) Disconnect the three connectors [1].



F-3-313

9) Remove the eight screws [1] and the main drive unit [2].

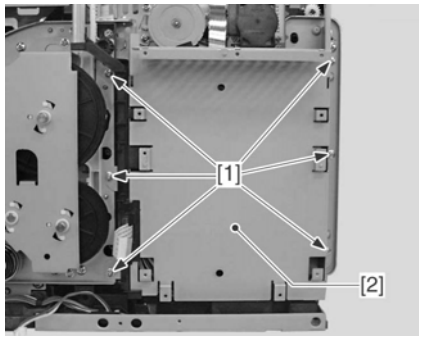


F-3-314

3.4.5.6 Removing the Rotary Drive Unit

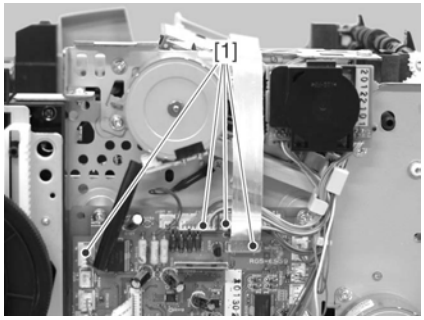
0007-8636

1) Remove the 6 screws [1], and detach the shield mount [2].



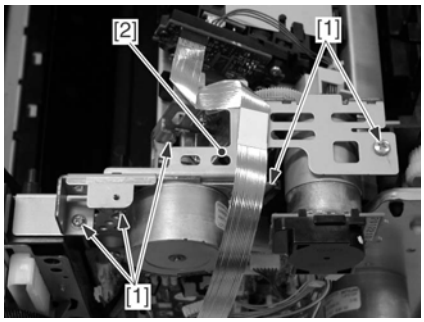
F-3-315

2) Disconnect the four connectors [1].



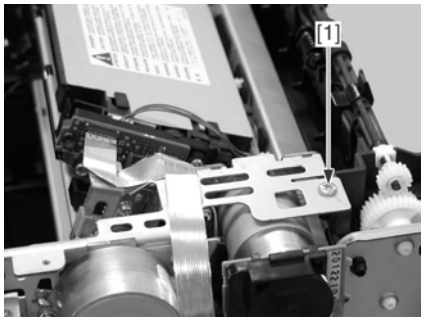
F-3-316

3) Remove the five screws [1] and the rotary drive unit [2].



F-3-317

⚠ The self-tapping screw [1] used for installing the rotary drive unit must be screwed the last.

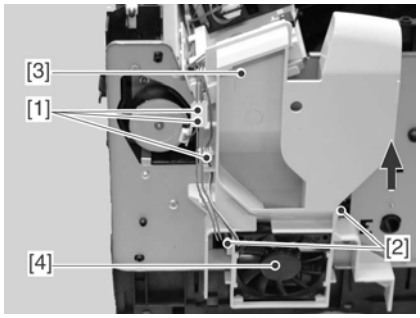


F-3-318

3.4.5.7 Removing the Developing Rotary Unit

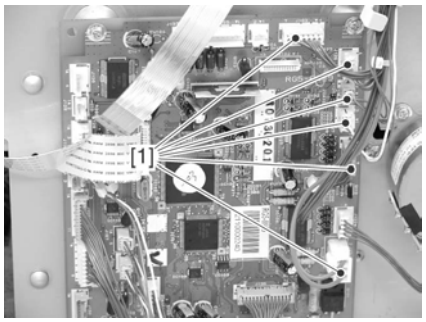
0007-8639

1) Disconnect the three connectors [1] and unhook the two claws [2].
2) Slide the fan duct [3] in the direction of the arrow. Remove the cooling fan [4] with the fan duct.



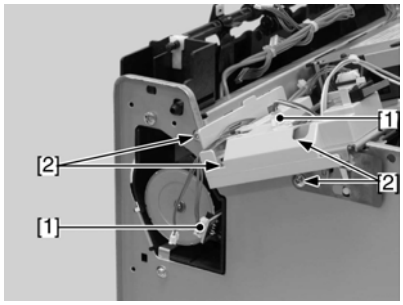
F-3-319

3) Disconnect the six connectors [1].



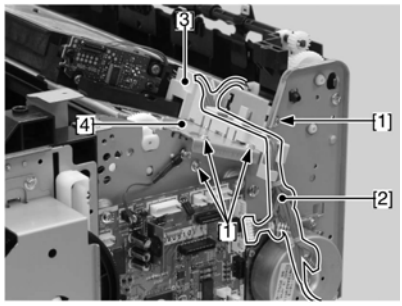
F-3-320

4) Disconnect the two connectors [1].
5) Remove the two screws [2].



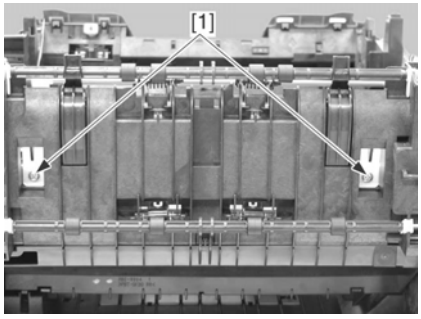
F-3-321

6) Remove the four screws [1].
7) Free the cable [2] from the cable guide [3]; then, detach the reinforcing plate [4].



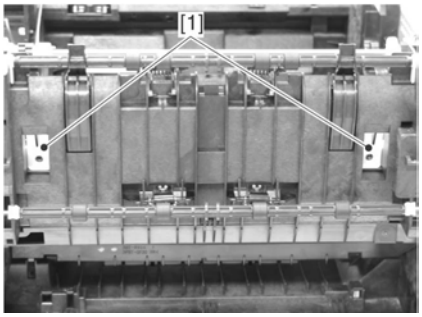
F-3-322

8) Remove the two screws [1].



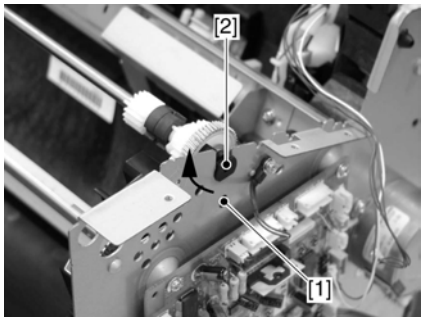
F-3-323

9) Press the upper areas of the two rotary holders with a screwdriver inward and make sure that the rotary holders [1] are removed from the printer.



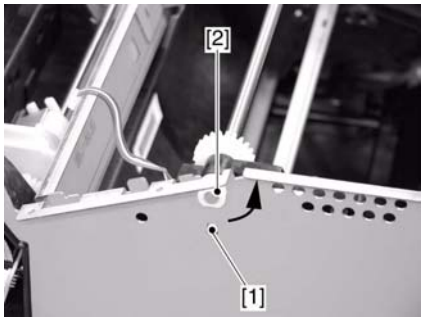
F-3-324

10) While pushing on the boss [1], rotate the rotary releasing lever (left) [2] in the direction of the arrow.



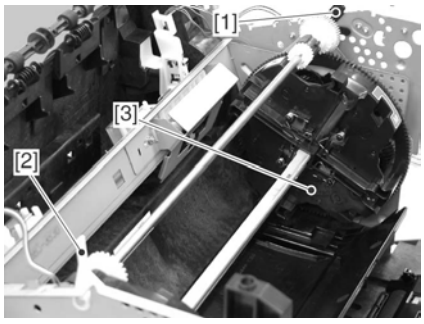
F-3-325

11) While pushing on the boss [1], rotate the rotary releasing lever (right) [2] in the direction of the arrow.



F-3-326

12) Lift up the developing rotary unit [3] in a horizontal position as holding the rotary release levers (right [2] and left [1]). Remove the unit.



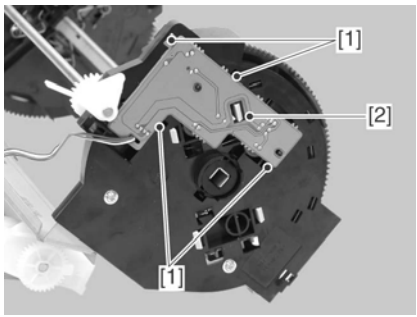
F-3-327

When installing the developing rotary unit, be sure to check that the 2 leading edges of rotary holders are set on the flame of the printer.

3.4.5.8 Removing the Developing Rotary/Toner Level Detection PCB

0007-6080

1) Unhook the four claws [1] Remove the developing rotary/toner level detection PCB [2] from the developing rotary unit.



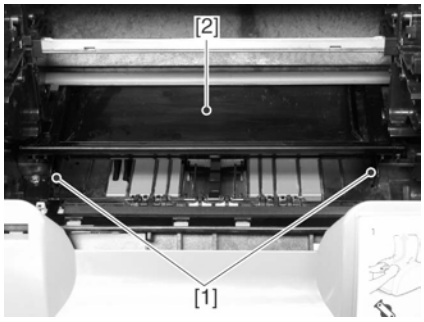
F-3-328

3.4.6 Secondary Transfer Roller

3.4.6.1 Removing the Secondary Transfer Roller

0005-8871

1) Open the upper cover unit.
2) Remove the two claws [1] and the toner tray [2].

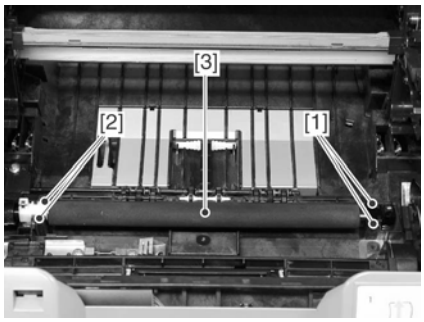


F-3-329

3) Remove the two screws [1] and the transfer inlet guide [2].

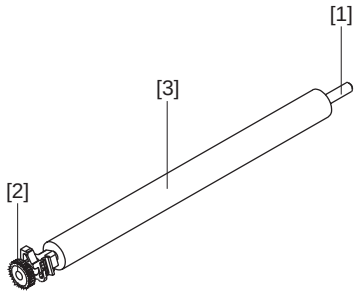
F-3-330

4) Unhook the two claws of the right shaft bushing [1].
5) Unhook the two claws of the left shaft bushing [2].
6) Lift up the secondary transfer roller [2] in a horizontal position and remove it.



F-3-331

When replacing the secondary transfer roller, hold the shaft [1] or the roller retainer [2] of the roller. Be sure not hold the sponge part [3] of the roller.
When installing the secondary transfer roller, be sure to set the spring inside the boss of the roller retainer to allow the spring to push up the roller retainer.



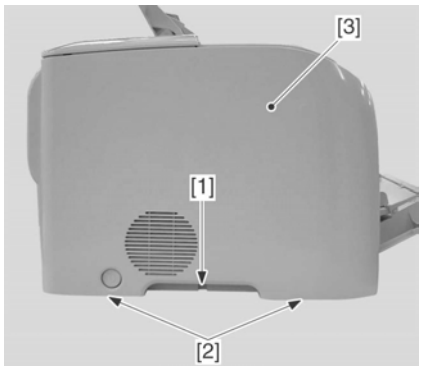
F-3-332

3.4.7 Toner Cartridge Motor

3.4.7.1 Removing the Upper Cover Unit

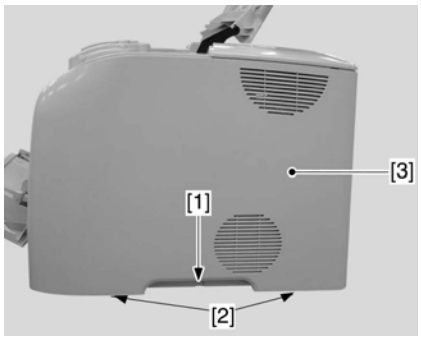
0007-8532

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



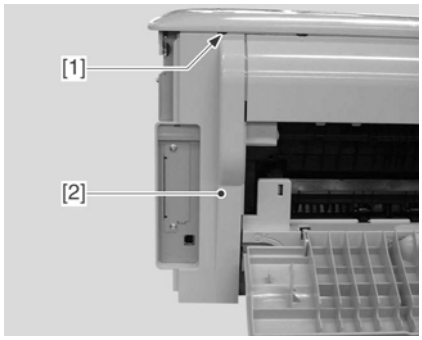
F-3-333

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



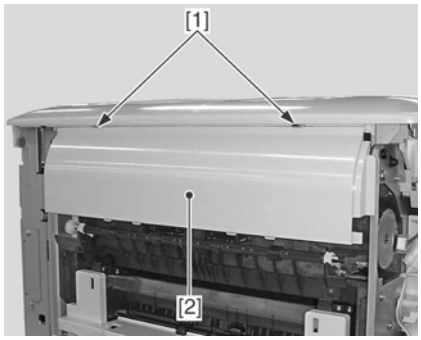
F-3-334

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



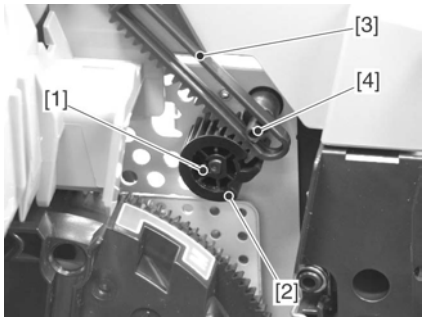
F-3-335

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



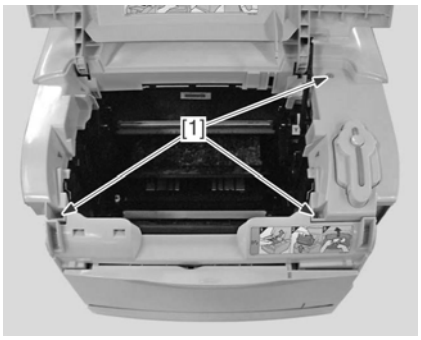
F-3-336

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



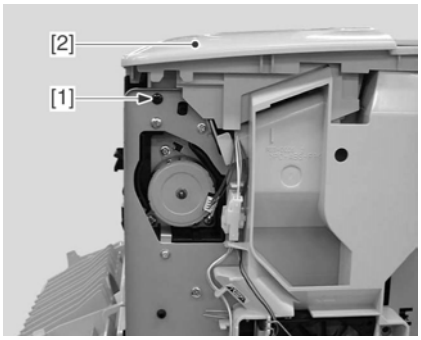
F-3-337

11) Remove the three screws [1].



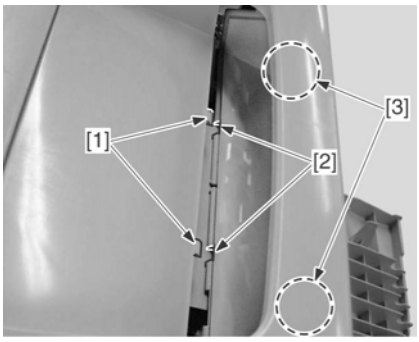
F-3-338

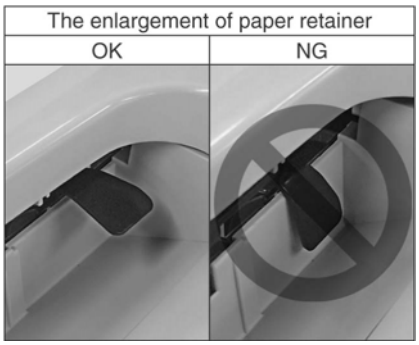
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-339

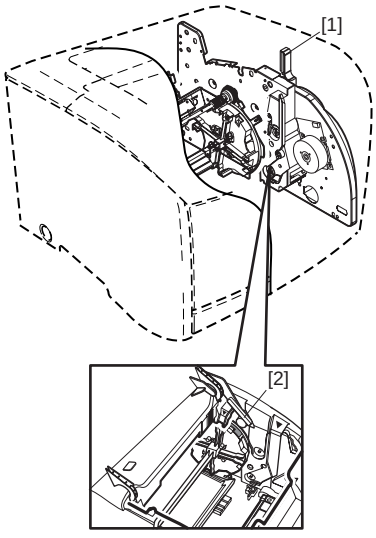
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



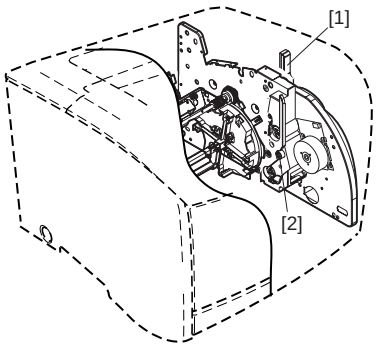


F-3-340

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-341

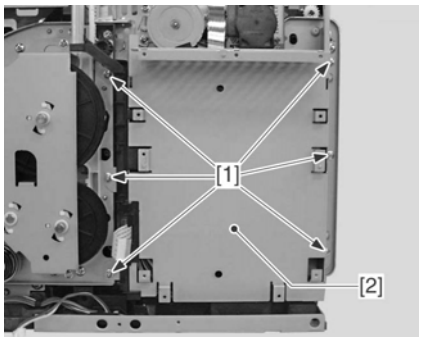


F-3-342

3.4.7.2 Removing the Rotary Drive Unit

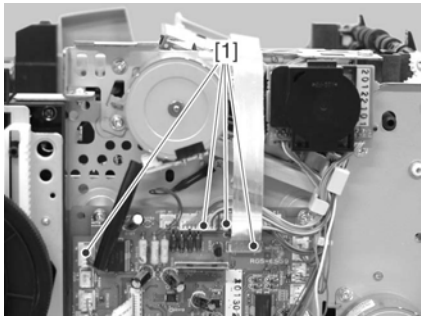
0007-8533

1) Remove the 6 screws [1], and detach the shield mount [2].



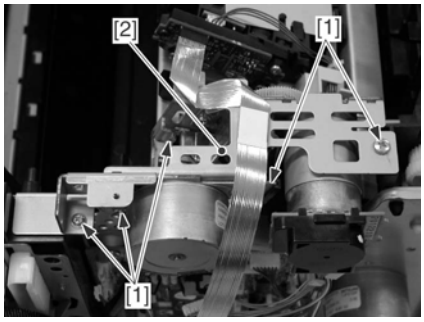
F-3-343

2) Disconnect the four connectors [1].



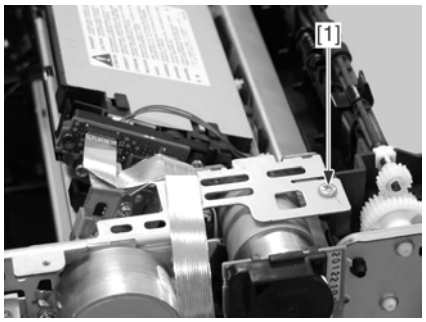
F-3-344

3) Remove the five screws [1] and the rotary drive unit [2].



F-3-345

⚠ The self-tapping screw [1] used for installing the rotary drive unit must be screwed the last.

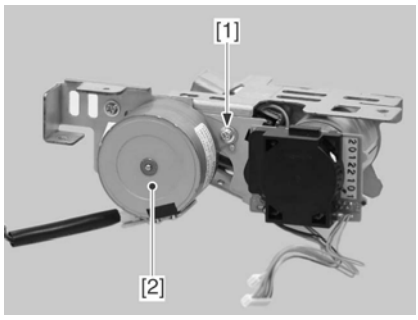


F-3-346

3.4.7.3 Removing the Toner Cartridge Motor

0005-8996

1) Remove the screw [1] and remove the toner cartridge motor [2].



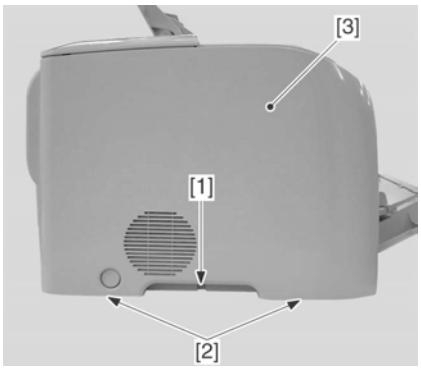
F-3-347

3.4.8 Waste Toner Detection PCB

3.4.8.1 Removing the Upper Cover Unit

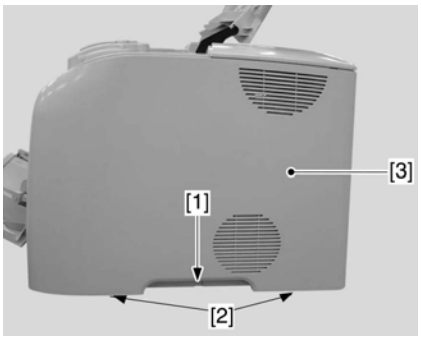
0007-8616

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



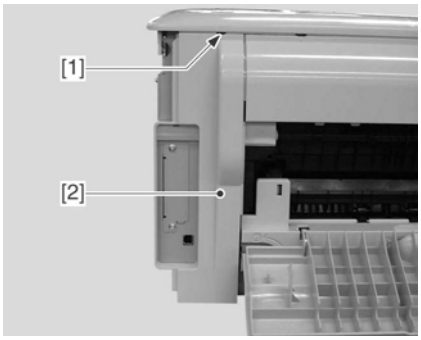
F-3-348

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



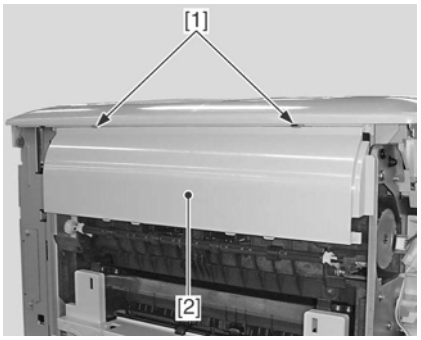
F-3-349

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



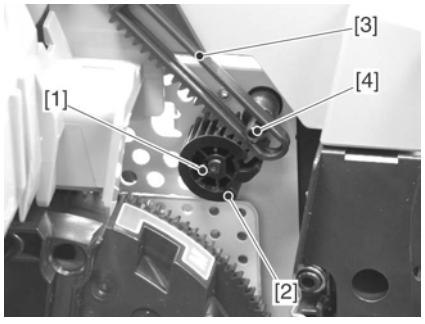
F-3-350

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



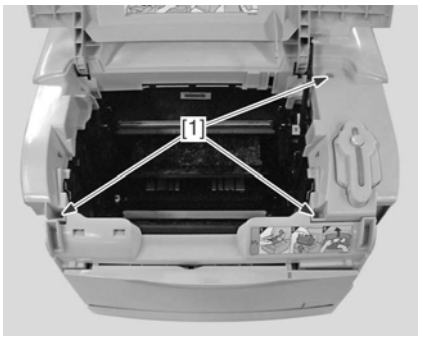
F-3-351

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



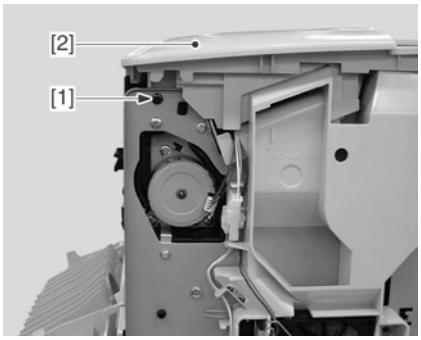
F-3-352

11) Remove the three screws [1].



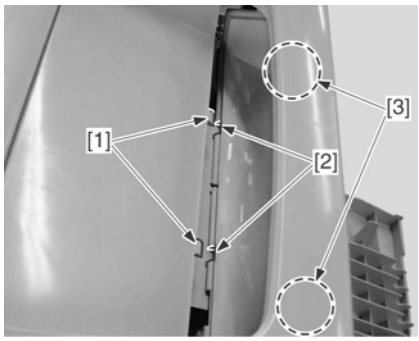
F-3-353

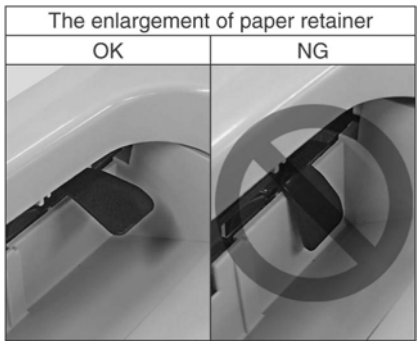
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-354

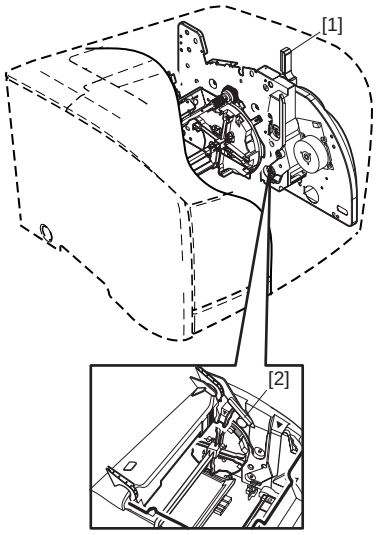
⚠
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



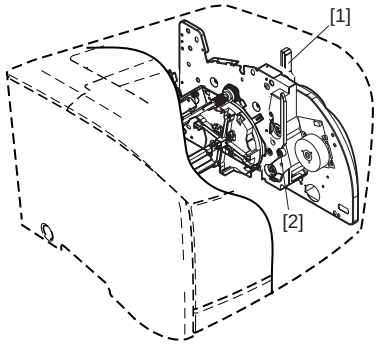


F-3-355

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-356

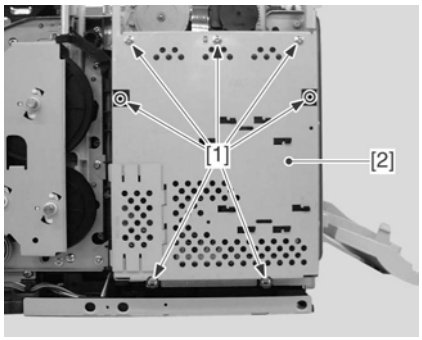


F-3-357

3.4.8.2 Removing the Video Controller PCB

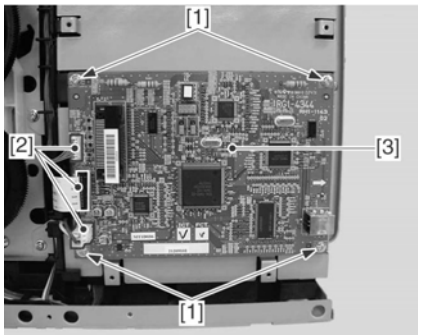
0007-8618

1) Remove the seven screws [1], and detach the shield cover.



F-3-358

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



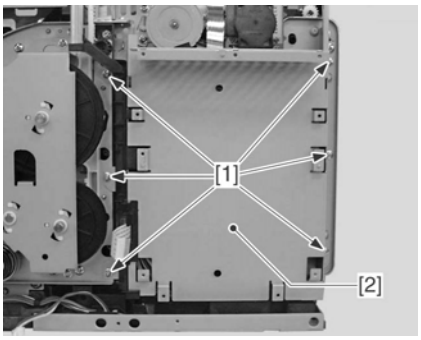
F-3-359

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.4.8.3 Removing the Waste Toner Detection PCB

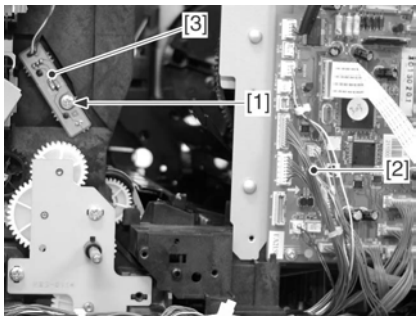
0007-6076

1) Remove the 6 screws [1], and detach the shield mount [2].



F-3-360

2) Remove the screw [1] and disconnect the connector [2] on the DC controller PCB (J108). Then, remove the waste toner detection PCB [2] from the printer.



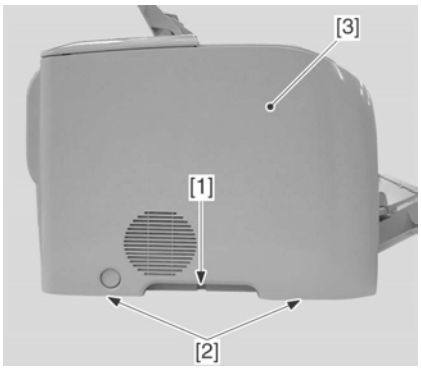
F-3-361

3.4.9 Rotary Drive Unit

3.4.9.1 Removing the Upper Cover Unit

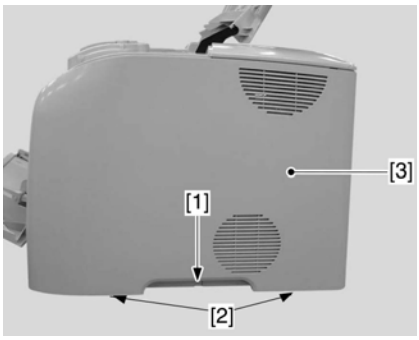
0007-8492

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



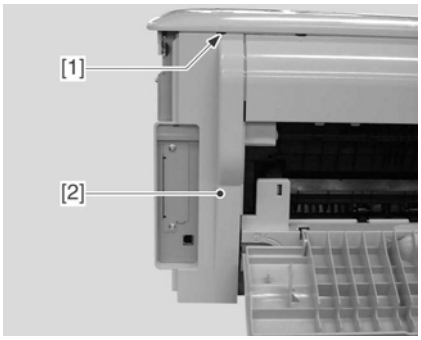
F-3-362

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



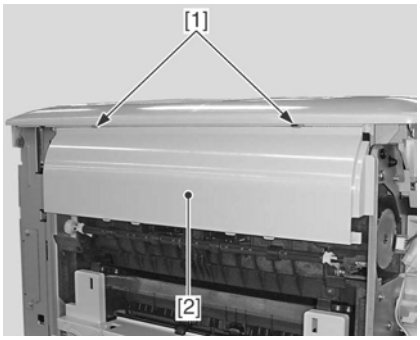
F-3-363

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



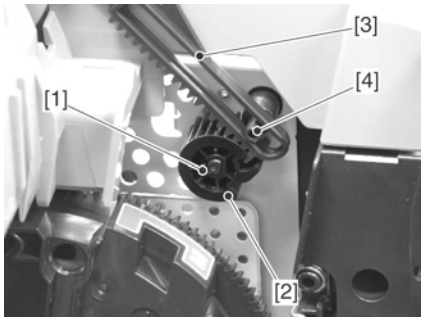
F-3-364

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



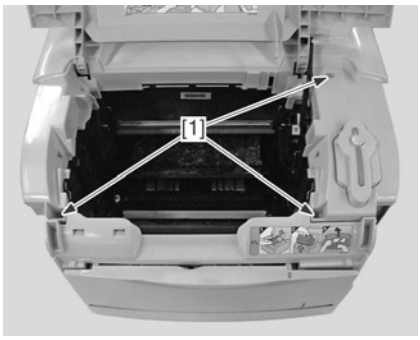
F-3-365

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



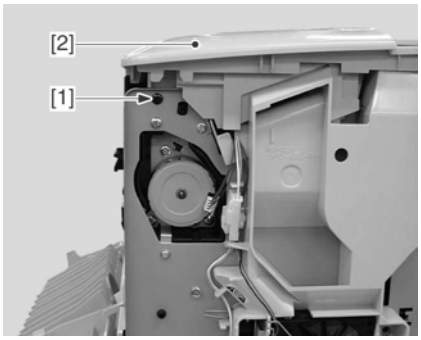
F-3-366

11) Remove the three screws [1].



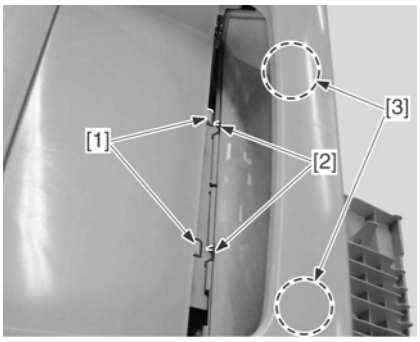
F-3-367

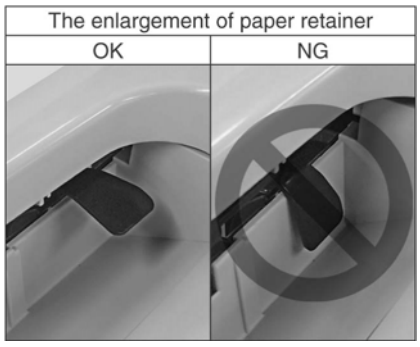
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-368

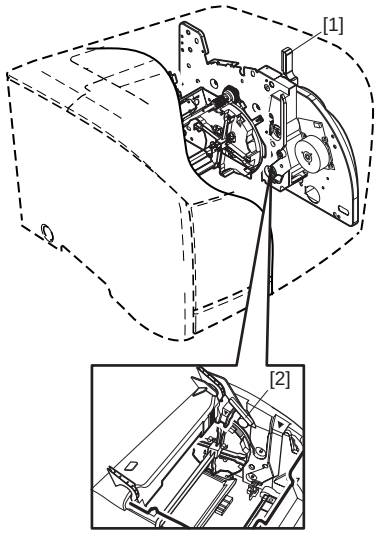
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



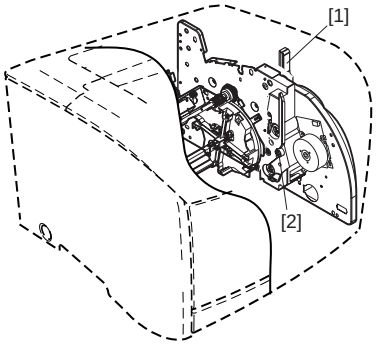


F-3-369

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-370

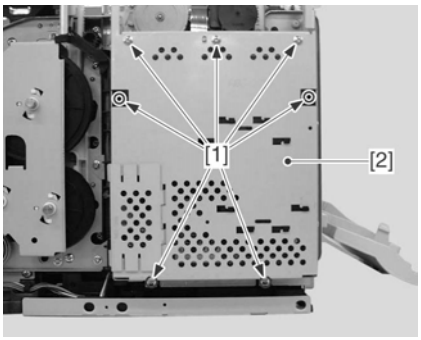


F-3-371

3.4.9.2 Removing the Video Controller PCB

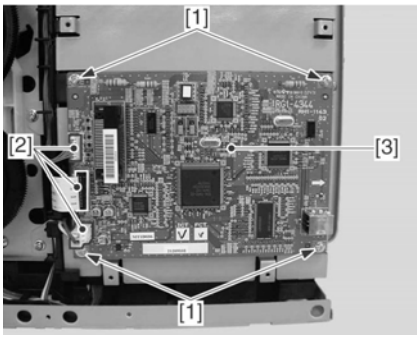
0007-8497

1) Remove the seven screws [1], and detach the shield cover.



F-3-372

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



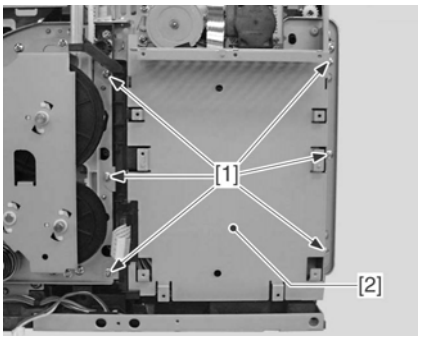
F-3-373

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.4.9.3 Removing the Rotary Drive Unit

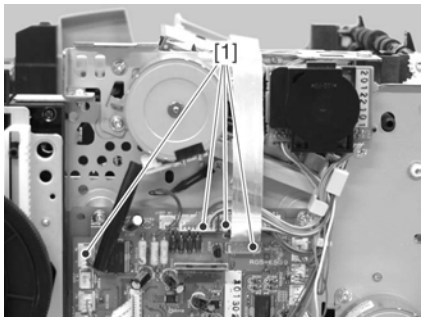
0005-8799

1) Remove the 6 screws [1], and detach the shield mount [2].



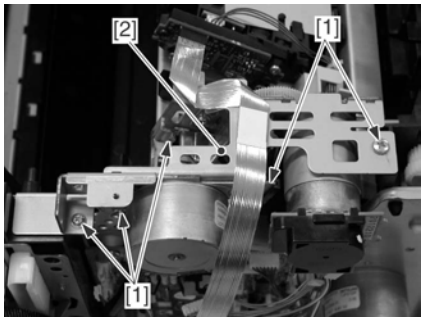
F-3-374

2) Disconnect the four connectors [1].



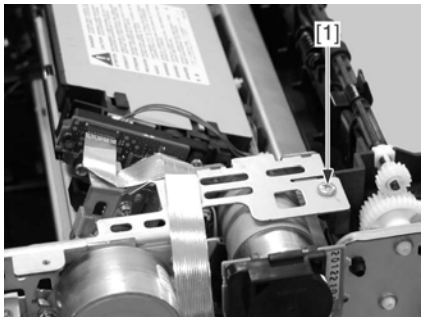
F-3-375

3) Remove the five screws [1] and the rotary drive unit [2].



F-3-376

The self-tapping screw [1] used for installing the rotary drive unit must be screwed the last.



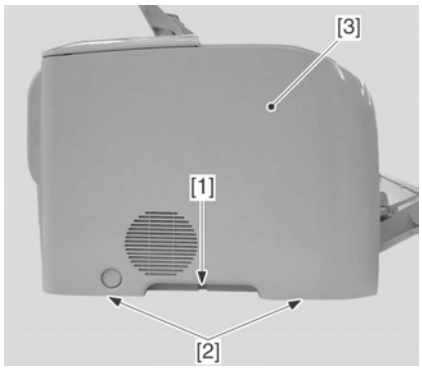
F-3-377

3.4.10 Engaging Motor

3.4.10.1 Removing the Left Cover

0007-8527

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.

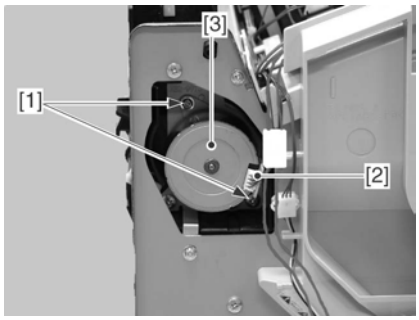


F-3-378

3.4.10.2 Removing the Engaging Motor

0005-8994

1) Remove the two screws [1] and disconnect the connector [2]
2) Remove the engaging motor [3] from the printer by sliding the motor to the direction of the upper.



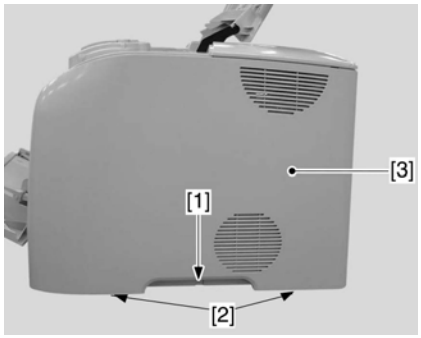
F-3-379

3.4.11 Density Detection PCB

3.4.11.1 Removing the right cover

0007-8597

1) Remove the screw [1] and unhook the five claws [2].
2) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.

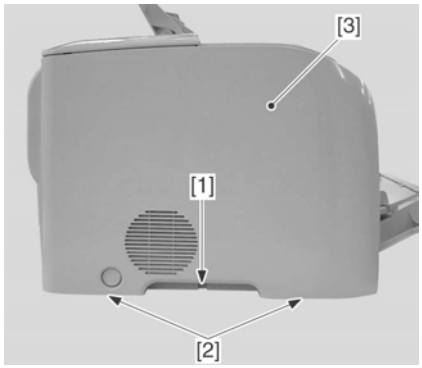


F-3-380

3.4.11.2 Removing the Left Cover

0007-8599

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.

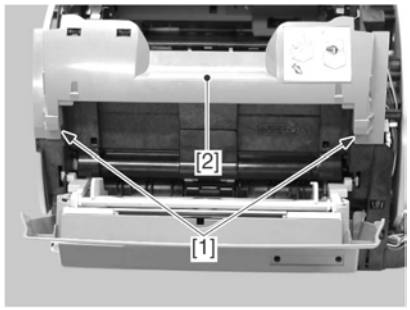


F-3-381

3.4.11.3 Removing the Density Detection PCB

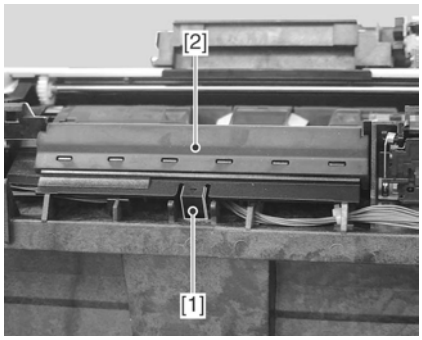
0007-6078

1) Unhook the 2 claws [1]. Remove the inner cover [2] from the printer by pulling the cover towards you.



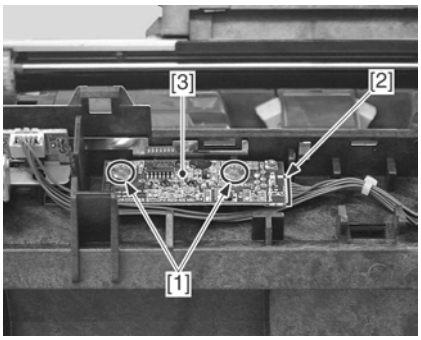
F-3-382

2) Free the claw [1], and detach the dust-blocking cover [2].



F-3-383

3) Remove the screw [1] and disconnect the connector [2]. Remove the density detection PCB [3].



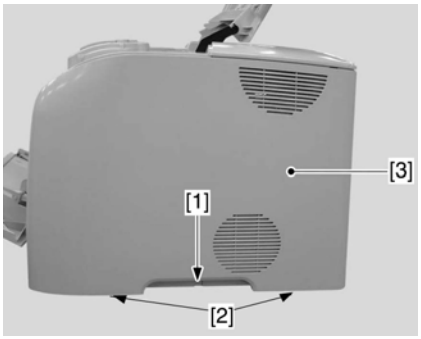
F-3-384

3.4.12 ITB Home Position Detection PCB

3.4.12.1 Removing the Rght Cover Unit

0007-8605

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.

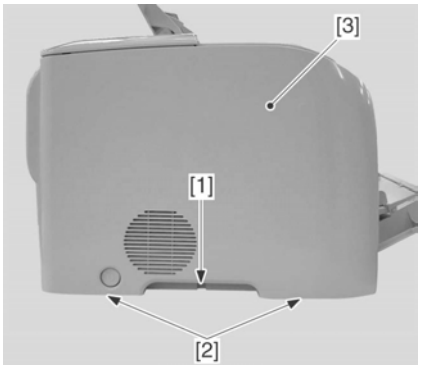


F-3-385

3.4.12.2 Removing the Left Cover

0007-8607

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.

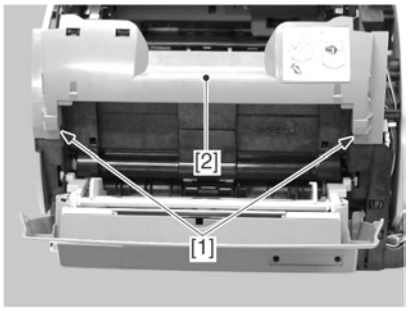


F-3-386

3.4.12.3 Removing the ITB Home Position Detection PCB

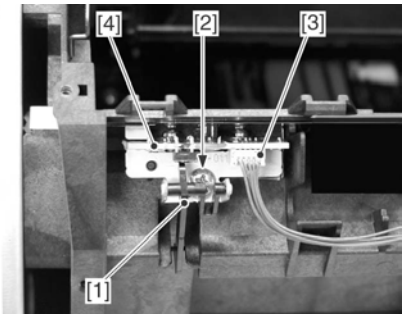
0007-6079

1) Unhook the 2 claws [1]. Remove the inner cover [2] from the printer by pulling the cover towards you.



F-3-387

2) Remove the test print switch lever [1].
3) Remove the screw [2] and disconnect the connector [3]. Remove the ITB home position detection PCB [4].



F-3-388

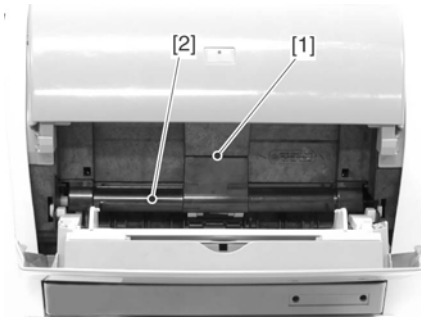
3.5 PICKUP/FEEDING/DELIVERY SYSTEM

3.5.1 Manual Pickup Roller

3.5.1.1 Removing the Multi-purpose Tray Pick-up Roller

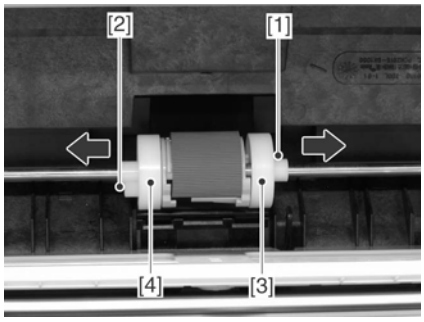
0005-8851

1) Open the front cover unit.
2) Unhook the claw [1]. Remove the pick-up roller protect cover [2].



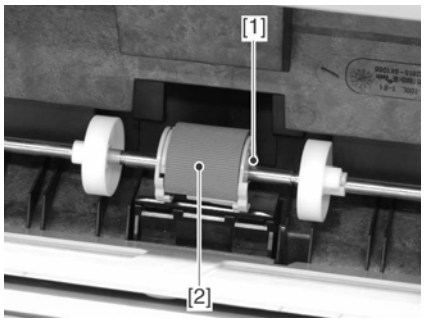
F-3-389

3) Pinch the right release claw [1] and slide the right bush [3] in the direction of the arrow.
4) Pinch the left release claw [2] and slide the left bush [4] in the direction of the arrow.



F-3-390

5) Pull up the multi-purpose tray pick-up roller [2] as pinching the release claws [1]. Remove the roller.



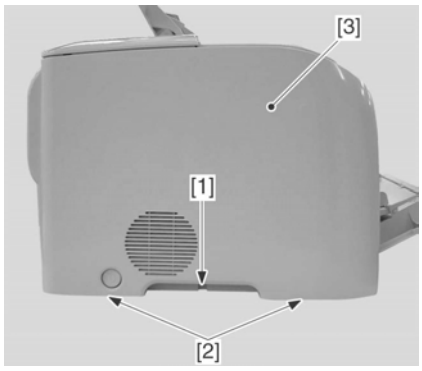
F-3-391

3.5.2 Manual Paper Sensor

3.5.2.1 Removing the Upper Cover Unit

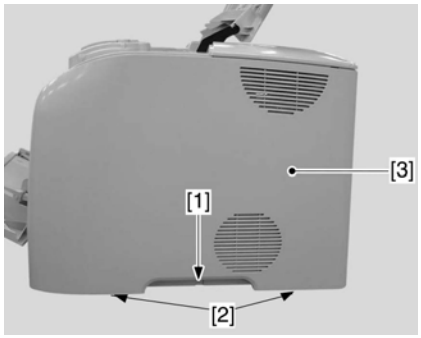
0007-8976

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



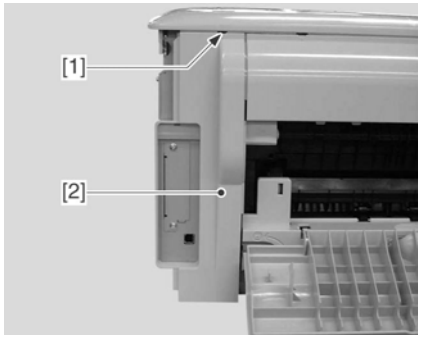
F-3-392

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



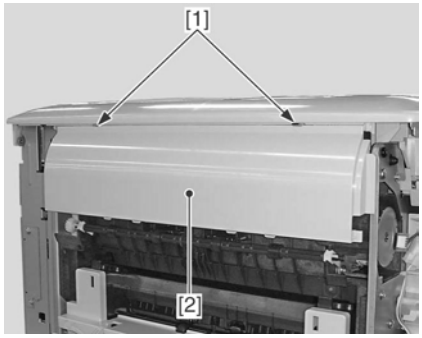
F-3-393

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



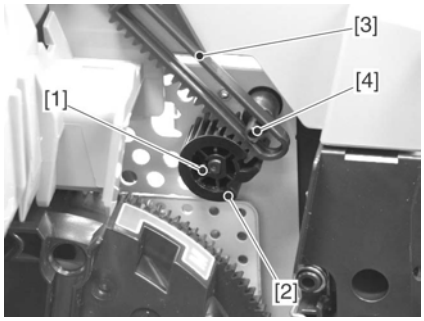
F-3-394

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



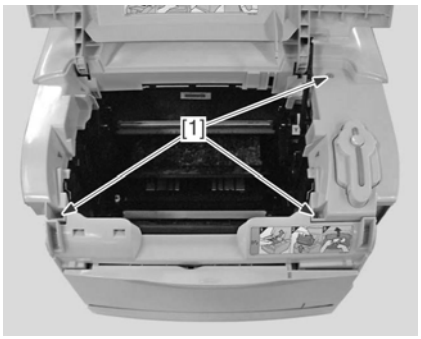
F-3-395

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



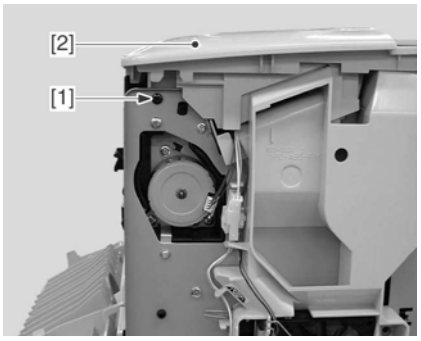
F-3-396

11) Remove the three screws [1].



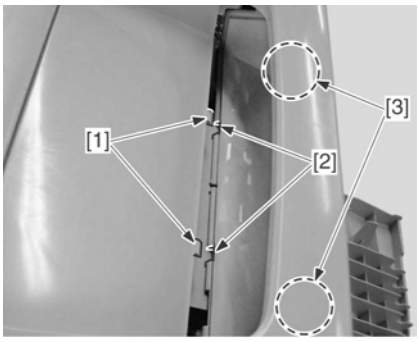
F-3-397

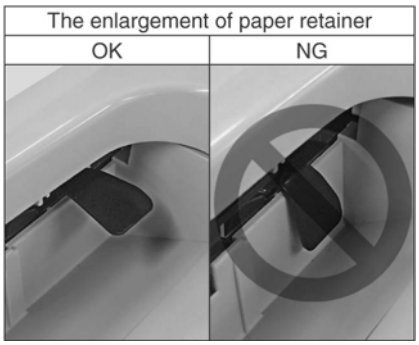
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-398

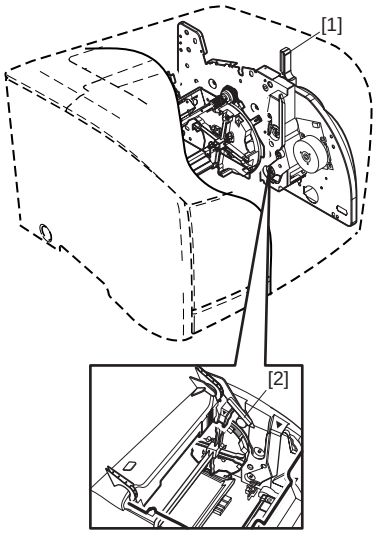
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



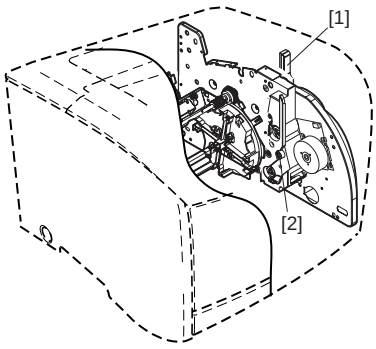


F-3-399

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-400

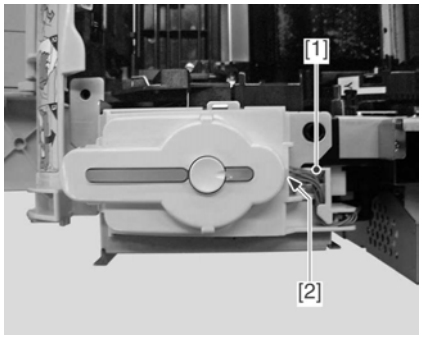


F-3-401

3.5.2.2 Removing the Control Panel

0007-8977

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

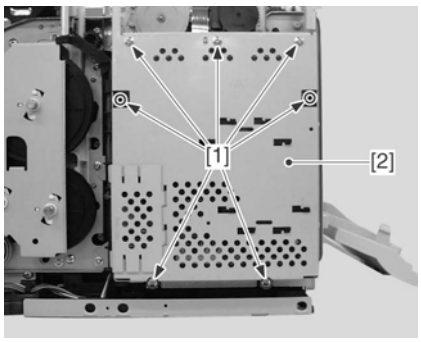


F-3-402

3.5.2.3 Removing the Video Controller PCB

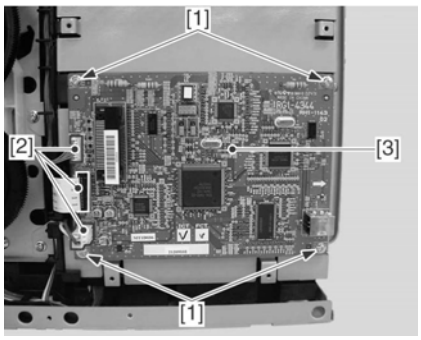
0007-8979

1) Remove the seven screws [1], and detach the shield cover.



F-3-403

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



F-3-404

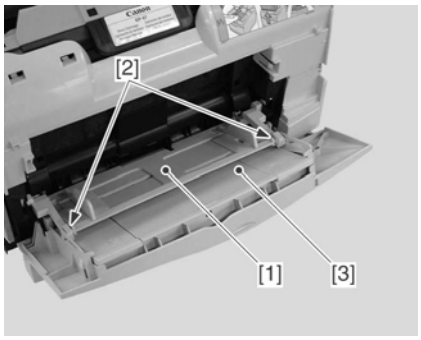
⚠

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.5.2.4 Removing the Front Cover Unit

0007-8980

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

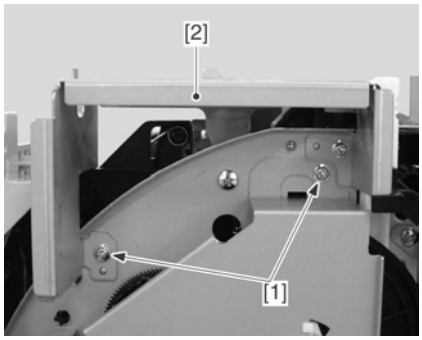


F-3-405

3.5.2.5 Removing the Main Drive Unit

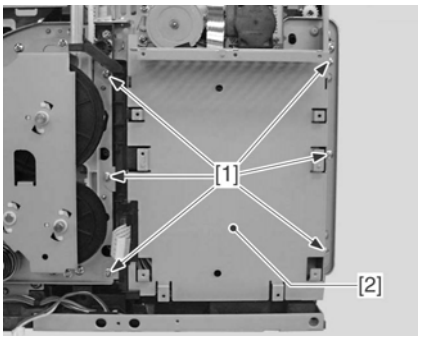
0007-8981

1) Remove the 2 screws [1], and detach the control panel mount [2].



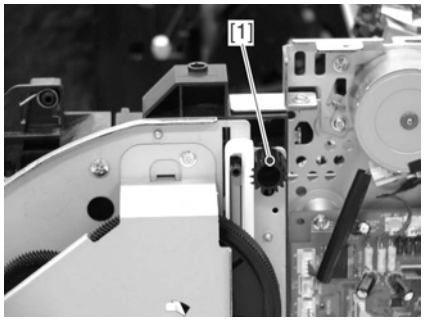
F-3-406

2) Remove the 6 screws [1], and detach the shield mount [2].



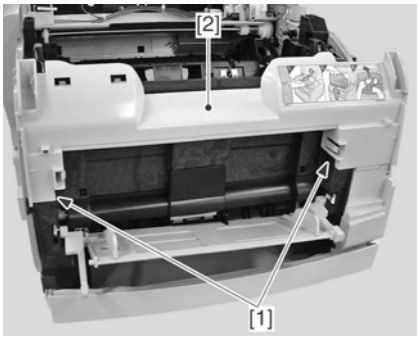
F-3-407

3) Remove the 18T gear [1].



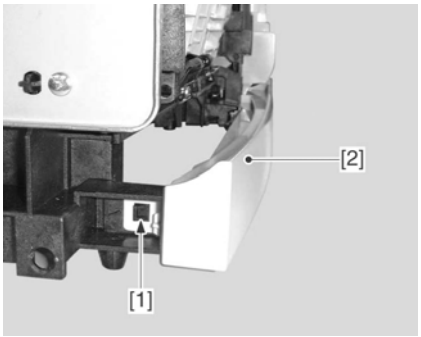
F-3-408

4) Free the 2 claws [1], and detach the inside cover [2].



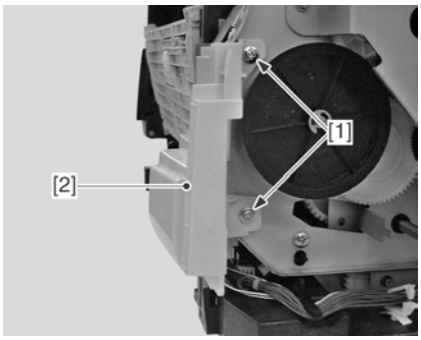
F-3-409

5) Free the claw [1], and detach the lower front cover [2].



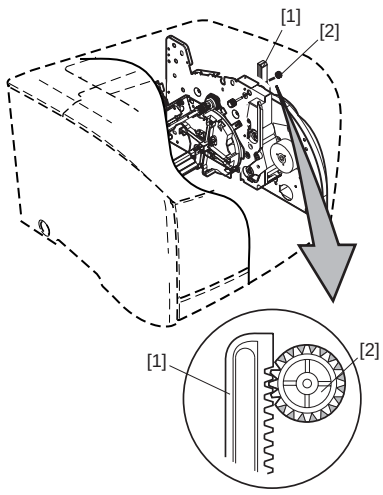
F-3-410

6) Remove the 2 screws [1], and detach the front auxiliary cover [2].



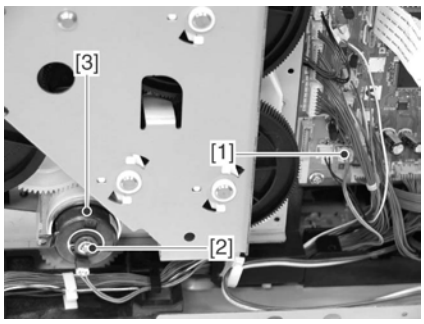
F-3-411

When installing the main drive unit, be sure to pull up the drive release lever [1] (drive release status) before installing the 18T gear [2] as shown in the figure right side.
Note that the 18T gear may not engage with the drive release lever if the gear is not placed properly.



F-3-412

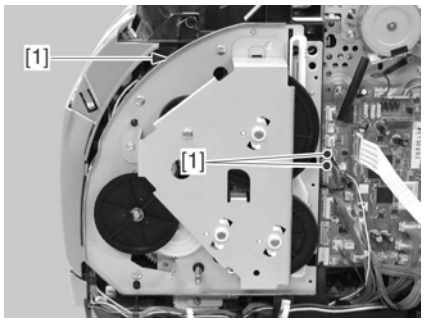
7) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



F-3-413

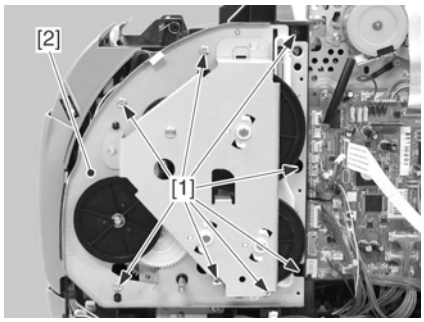
The connector on the registration clutch side cannot be disconnected. When removing the registration clutch, be sure to disconnect the connector on the DC controller PCB (J113).

8) Disconnect the three connectors [1].



F-3-414

9) Remove the eight screws [1] and the main drive unit [2].

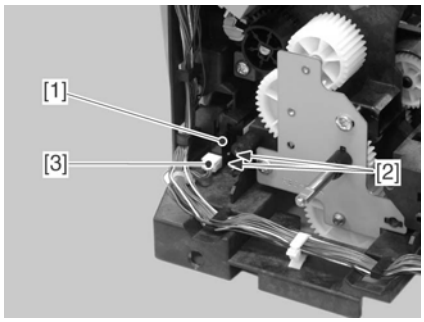


F-3-415

3.5.2.6 Removing the Multi-purpose Tray Paper Sensor

0005-8937

1) Disconnect the connector [1] and unhook the two claws [2]. Remove the multi-purpose tray paper sensor [3].



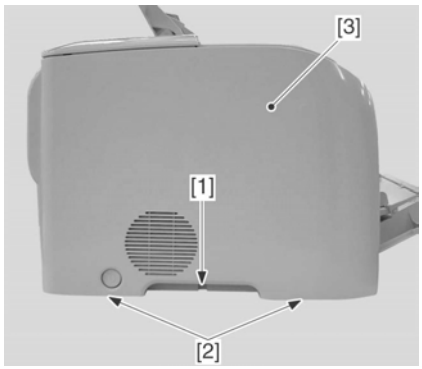
F-3-416

3.5.3 Multi-purpose Pickup Solenoid

3.5.3.1 Removing the Upper Cover Unit

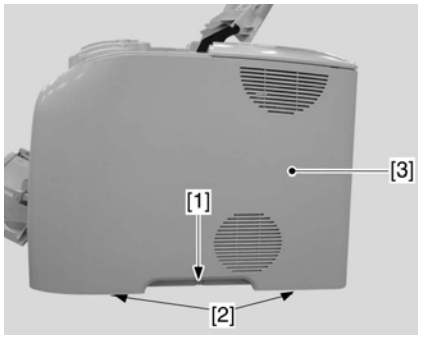
0007-8982

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



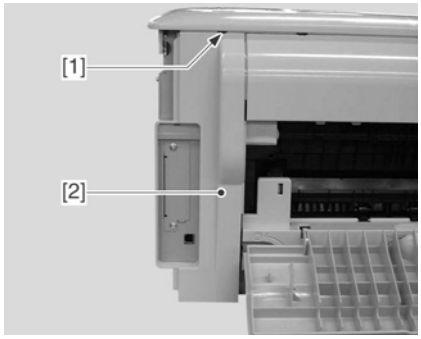
F-3-417

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



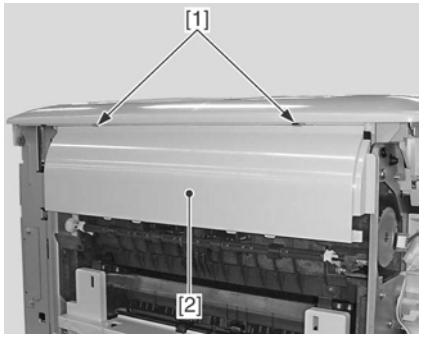
F-3-418

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



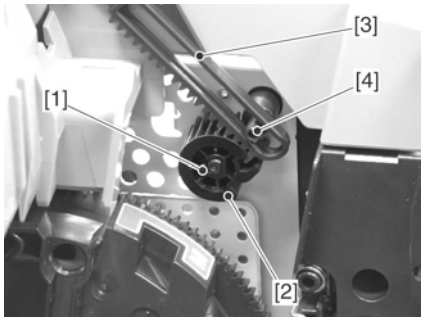
F-3-419

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



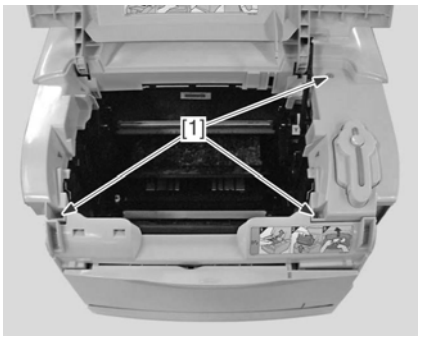
F-3-420

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



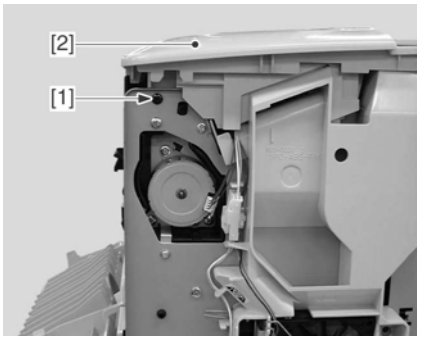
F-3-421

11) Remove the three screws [1].



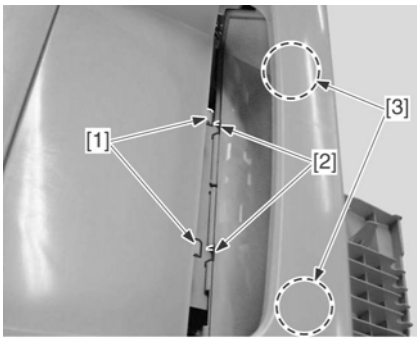
F-3-422

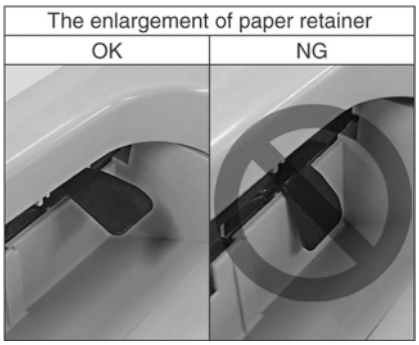
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-423

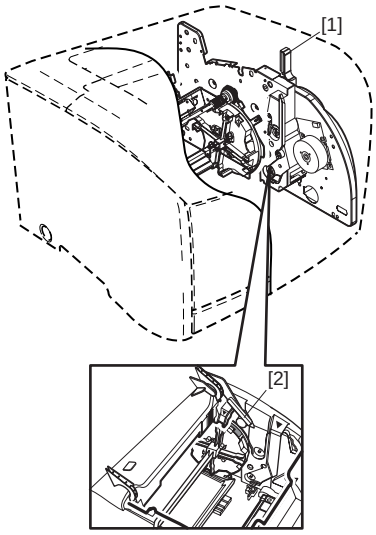
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



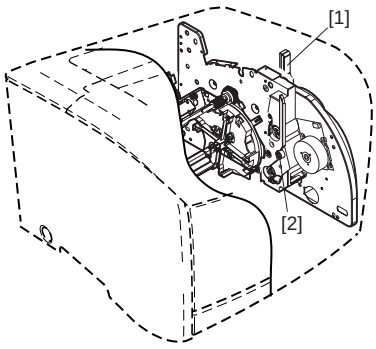


F-3-424

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-425

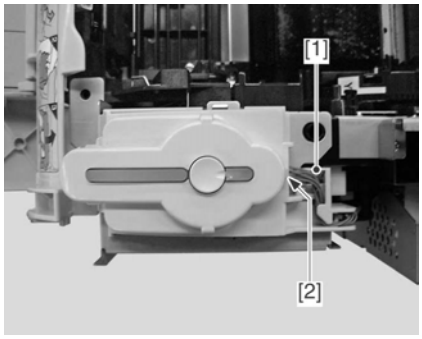


F-3-426

3.5.3.2 Removing the Control Panel

0007-8983

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

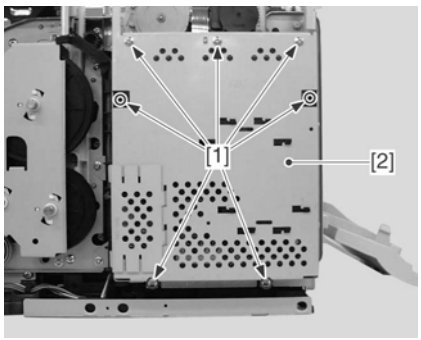


F-3-427

3.5.3.3 Removing the Video Controller PCB

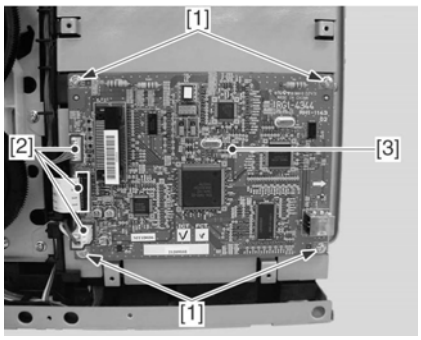
0007-8984

1) Remove the seven screws [1], and detach the shield cover.



F-3-428

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



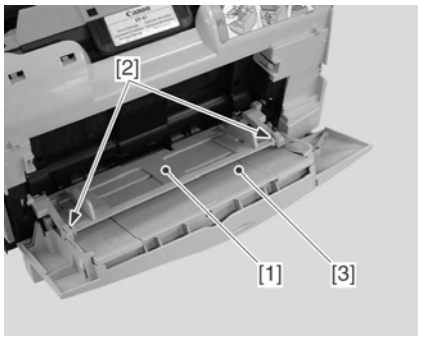
F-3-429

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.5.3.4 Removing the Front Cover Unit

0007-8985

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

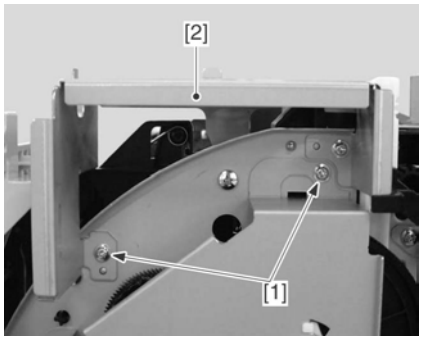


F-3-430

3.5.3.5 Removing the Main Drive Unit

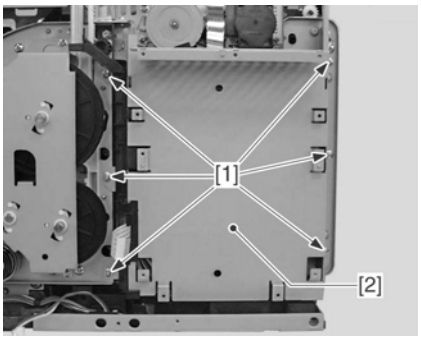
0007-8986

1) Remove the 2 screws [1], and detach the control panel mount [2].



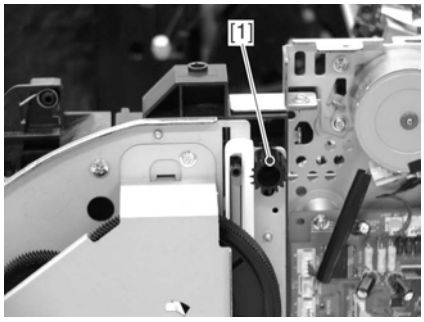
F-3-431

2) Remove the 6 screws [1], and detach the shield mount [2].



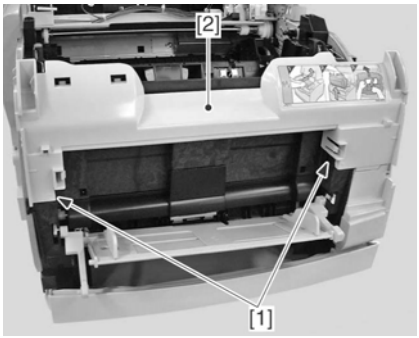
F-3-432

3) Remove the 18T gear [1].



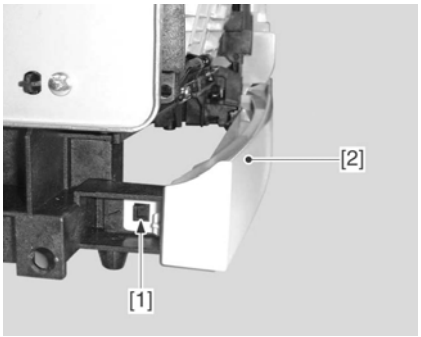
F-3-433

4) Free the 2 claws [1], and detach the inside cover [2].



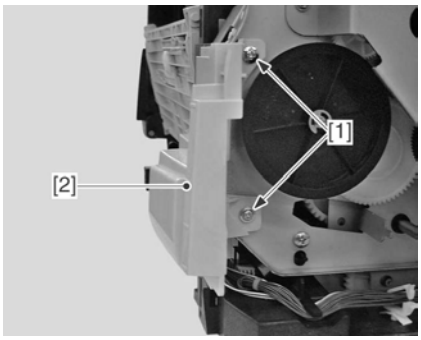
F-3-434

5) Free the claw [1], and detach the lower front cover [2].



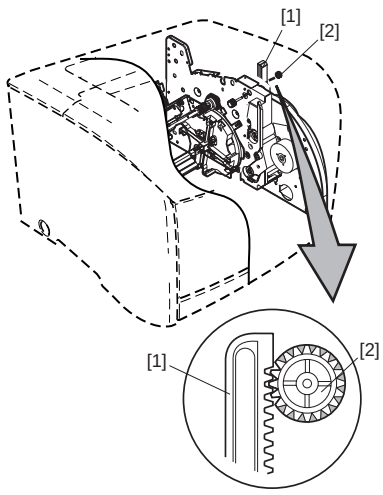
F-3-435

6) Remove the 2 screws [1], and detach the front auxiliary cover [2].



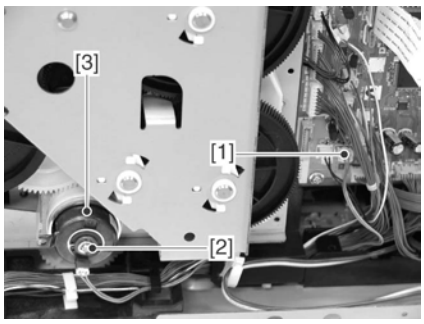
F-3-436

When installing the main drive unit, be sure to pull up the drive release lever [1] (drive release status) before installing the 18T gear [2] as shown in the figure right side.
Note that the 18T gear may not engage with the drive release lever if the gear is not placed properly.



F-3-437

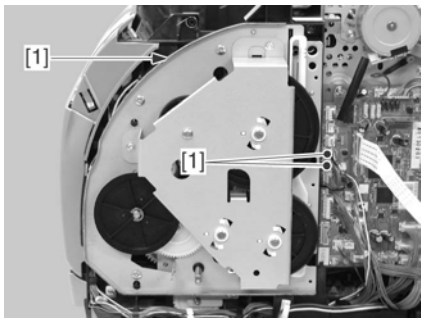
7) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



F-3-438

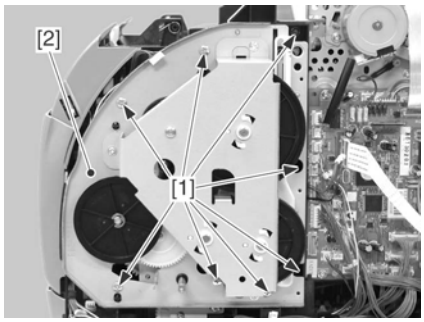
The connector on the registration clutch side cannot be disconnected. When removing the registration clutch, be sure to disconnect the connector on the DC controller PCB (J113).

8) Disconnect the three connectors [1].



F-3-439

9) Remove the eight screws [1] and the main drive unit [2].

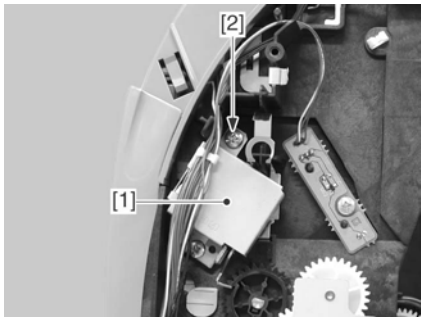


F-3-440

3.5.3.6 Removing the Multi-purpose Tray Pick-up Solenoid

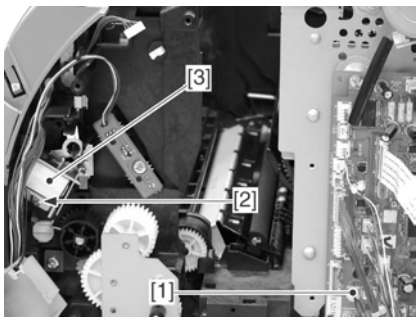
0005-8990

1) Remove the screw [1] and the pick-up solenoid cover [2].



F-3-441

2) Disconnect the connector [1] and remove the screw [2]. Remove the multi-purpose tray pick-up solenoid [3].



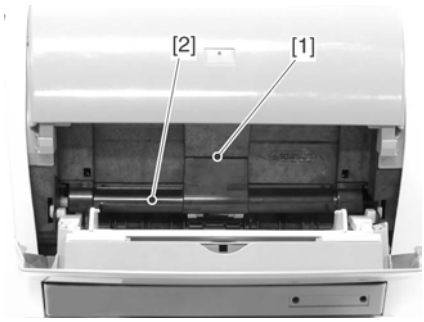
F-3-442

3.5.4 Manual Separation Pad

3.5.4.1 Removing the Pick-up Roller Protect Cover

0007-8990

1) Open the front cover unit.
2) Unhook the claw [1]. Remove the pick-up roller protect cover [2].

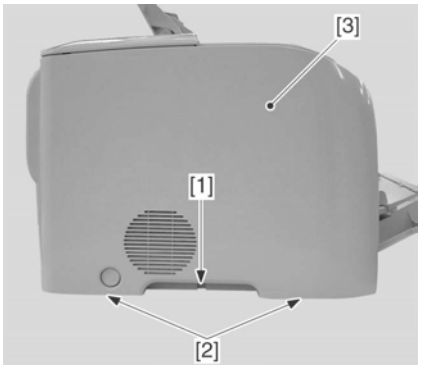


F-3-443

3.5.4.2 Removing the Left Cover

0007-8991

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.

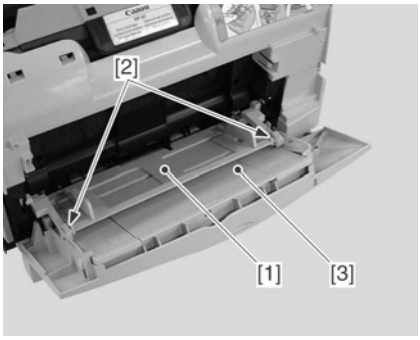


F-3-444

3.5.4.3 Removing the Front Cover Unit

0007-8987

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

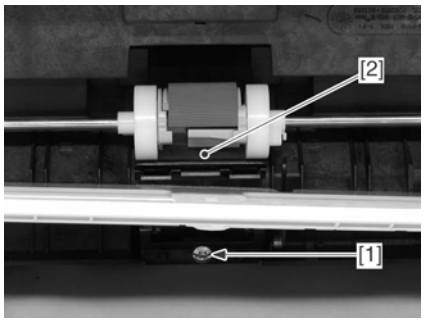


F-3-445

3.5.4.4 Removing the Separation Pad

0005-8858

1) Remove the screw [1] and the separation pad [2].



F-3-446

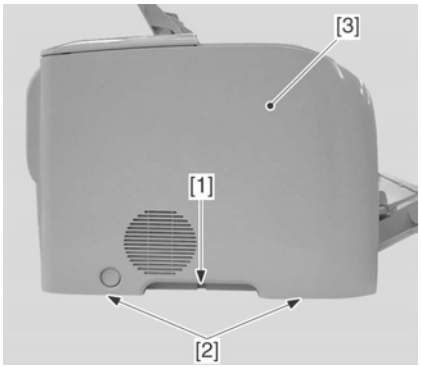
When installing the separation pad, do not touch the pad.

3.5.5 Registration Detection PCB

3.5.5.1 Removing the Upper Cover Unit

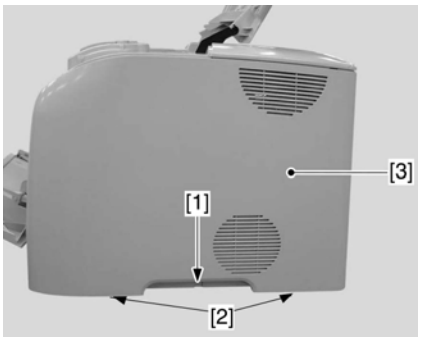
0007-8994

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



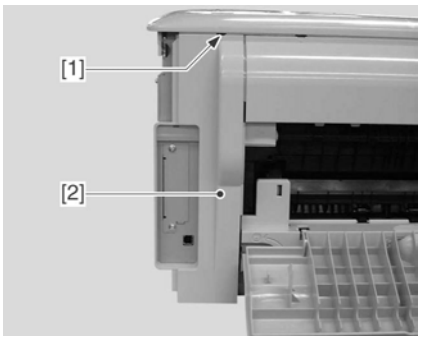
F-3-447

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



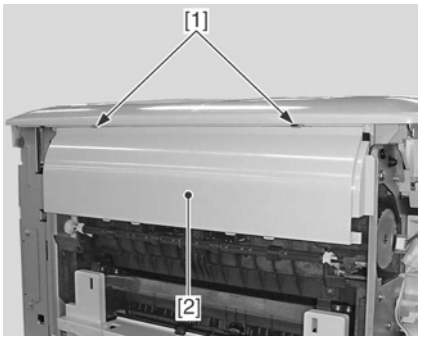
F-3-448

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



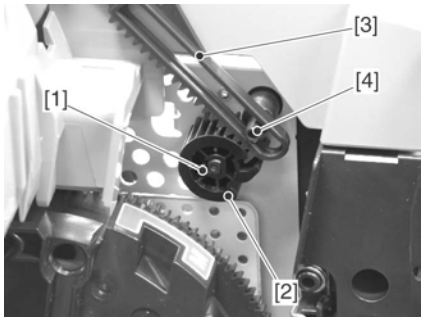
F-3-449

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



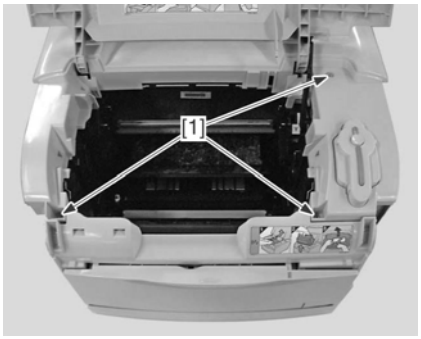
F-3-450

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



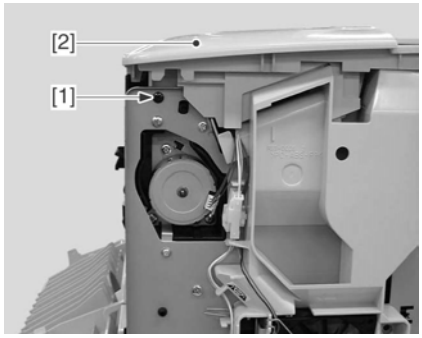
F-3-451

11) Remove the three screws [1].



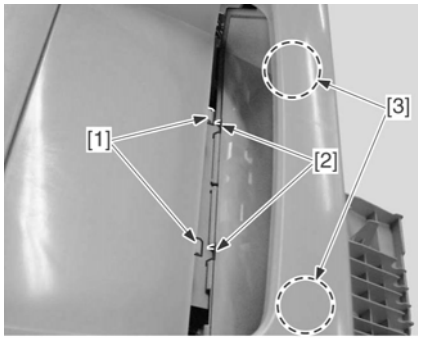
F-3-452

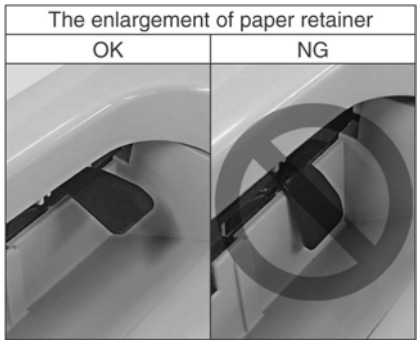
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-453

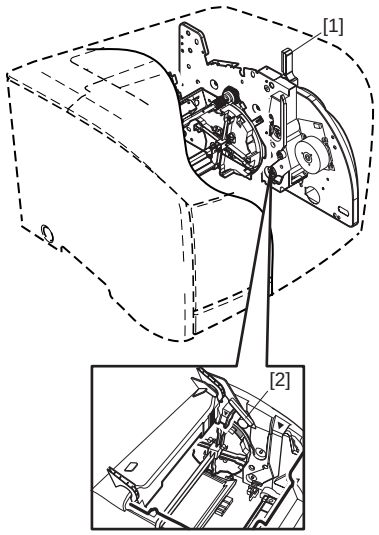
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



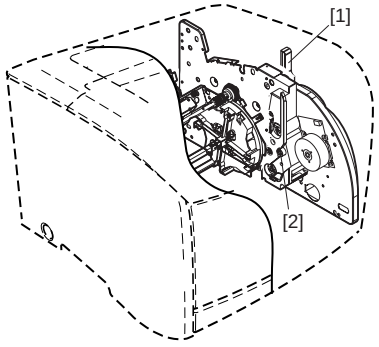


F-3-454

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-455

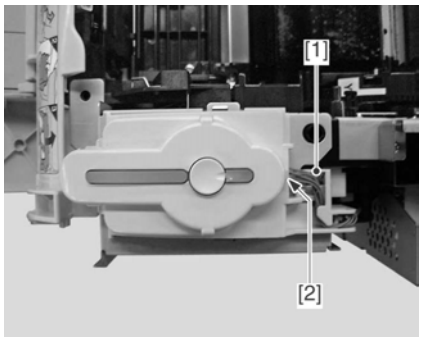


F-3-456

3.5.5.2 Removing the Control Panel

0007-8995

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

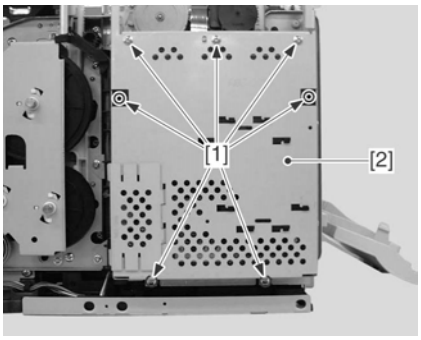


F-3-457

3.5.5.3 Removing the Video Controller PCB

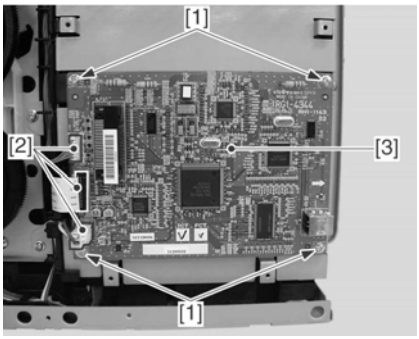
0007-8996

1) Remove the seven screws [1], and detach the shield cover.



F-3-458

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



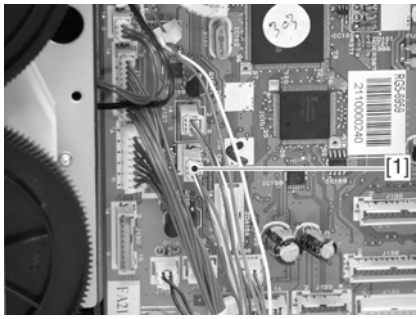
F-3-459

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.5.5.4 Removing the Registration Detection PCB

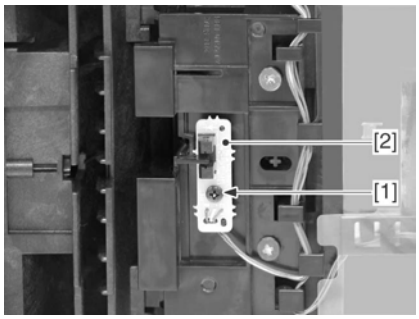
0007-6077

1) Disconnect the connector [1] from the DC Controller PCB.



F-3-460

2) Remove the screw [1] and the registration detection PCB [2].



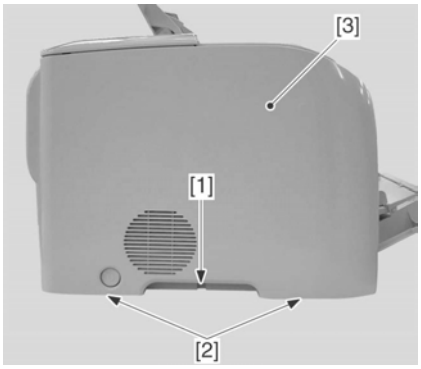
F-3-461

3.5.6 Registration Roller Unit

3.5.6.1 Removing the Upper Cover Unit

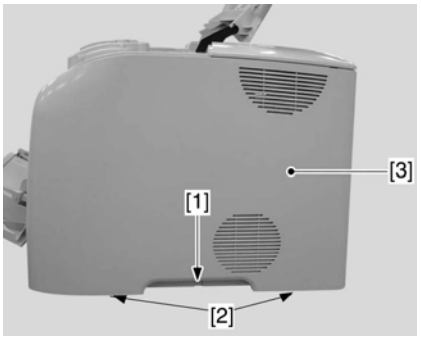
0007-8998

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



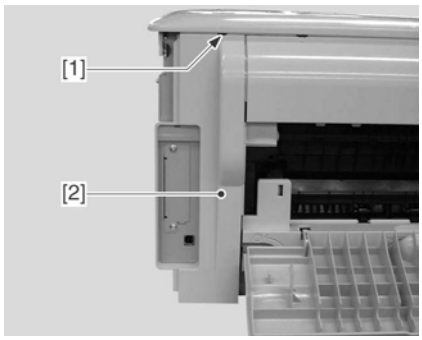
F-3-462

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



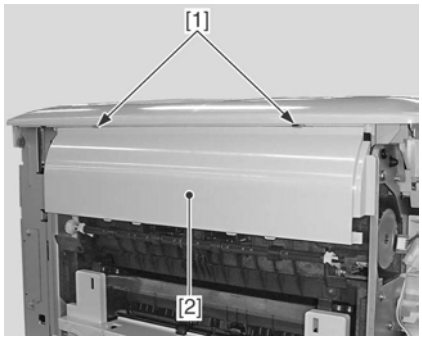
F-3-463

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



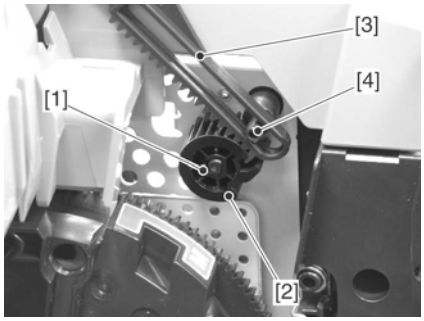
F-3-464

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



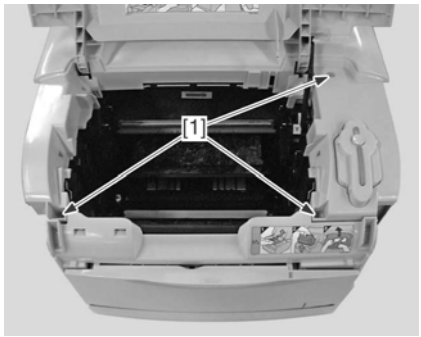
F-3-465

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



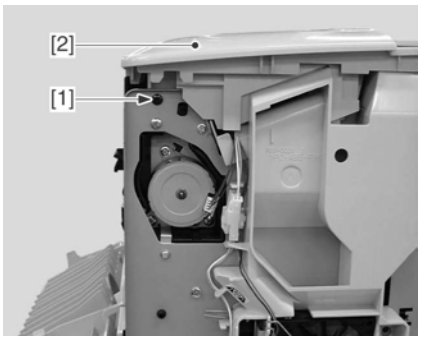
F-3-466

11) Remove the three screws [1].



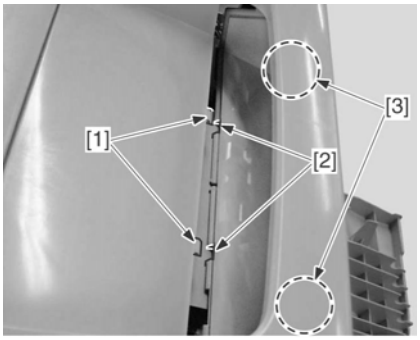
F-3-467

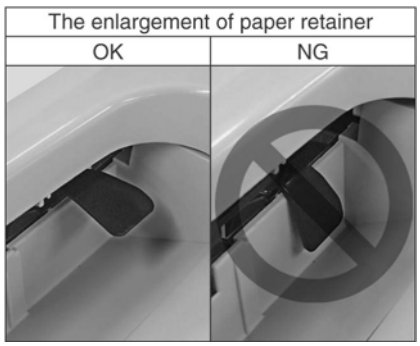
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-468

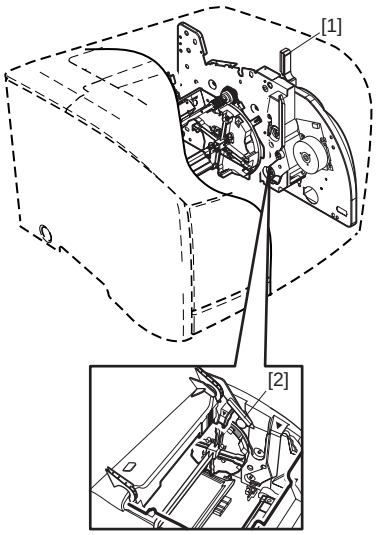
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



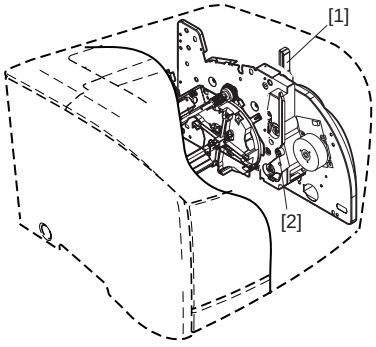


F-3-469

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-470

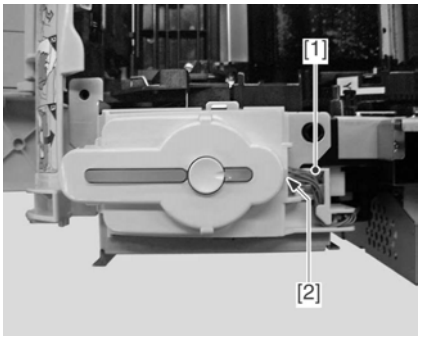


F-3-471

3.5.6.2 Removing the Control Panel

0007-8999

1) Free the claw [1], and disconnect the connector [2]; then, detach the control panel for the machine.

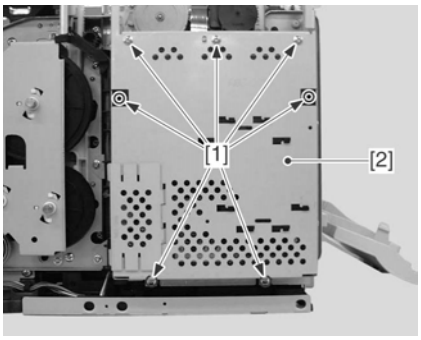


F-3-472

3.5.6.3 Removing the Video Controller PCB

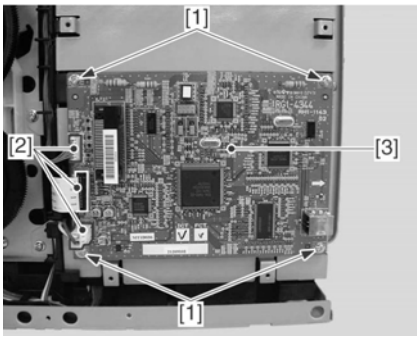
0007-9001

1) Remove the seven screws [1], and detach the shield cover.



F-3-473

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



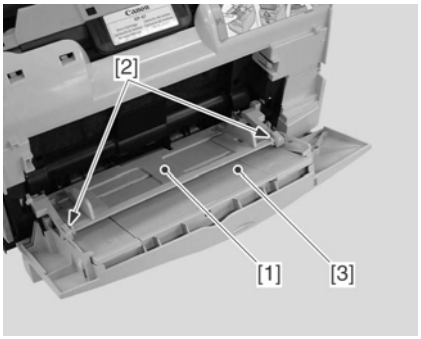
F-3-474

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.5.6.4 Removing the Front Cover Unit

0007-9003

1) Unhook the two claws [2] holding the multi-purpose tray [1].
2) Slide the front cover unit [3] to the left. Pull out the front cover unit to the right and remove it off the printer.

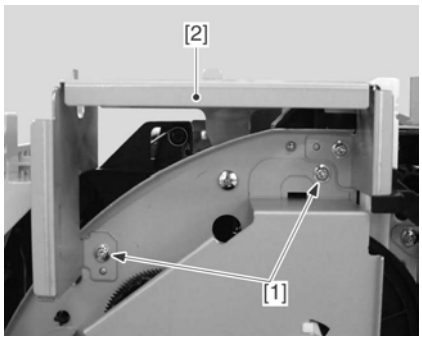


F-3-475

3.5.6.5 Removing the Main Drive Unit

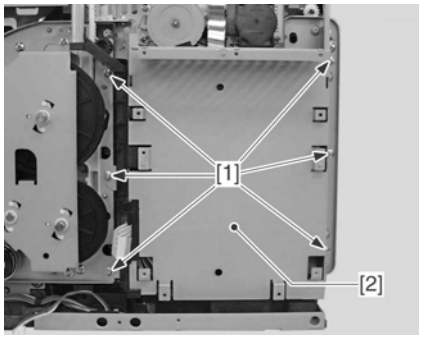
0007-9004

1) Remove the 2 screws [1], and detach the control panel mount [2].



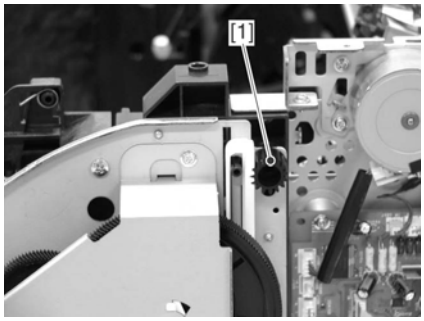
F-3-476

2) Remove the 6 screws [1], and detach the shield mount [2].



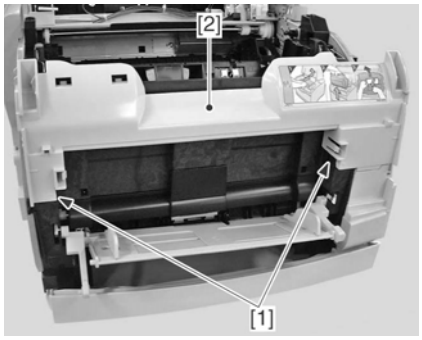
F-3-477

3) Remove the 18T gear [1].



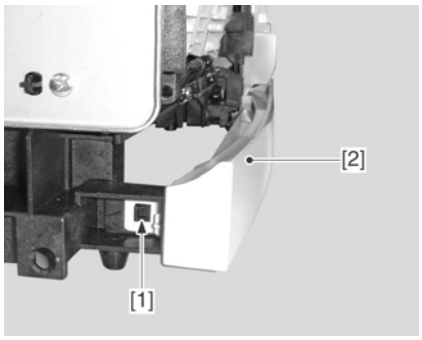
F-3-478

4) Free the 2 claws [1], and detach the inside cover [2].



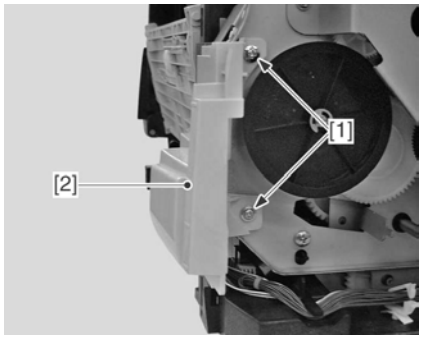
F-3-479

5) Free the claw [1], and detach the lower front cover [2].



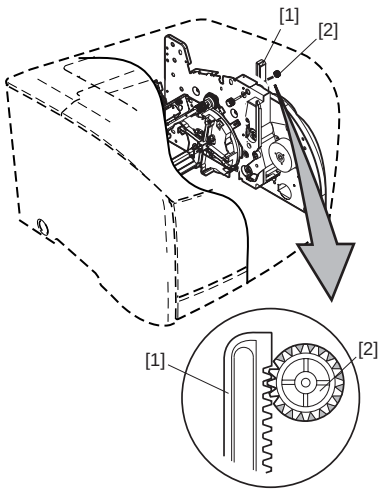
F-3-480

6) Remove the 2 screws [1], and detach the front auxiliary cover [2].



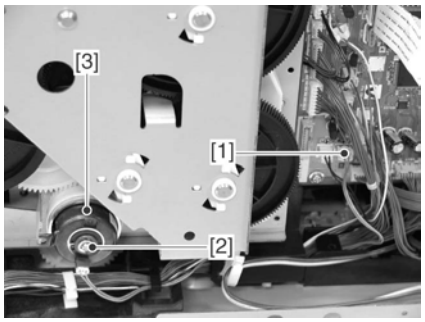
F-3-481

⚠ When installing the main drive unit, be sure to pull up the drive release lever [1] (drive release status) before installing the 18T gear [2] as shown in the figure right side.
Note that the 18T gear may not engage with the drive release lever if the gear is not placed properly.



F-3-482

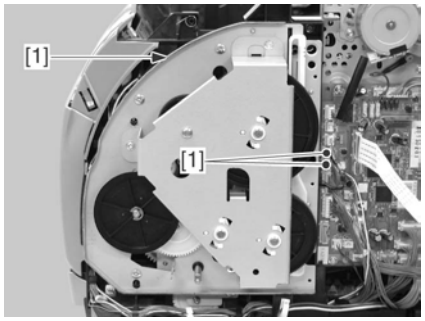
7) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



F-3-483

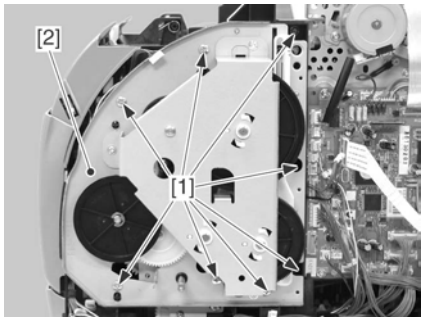
⚠ The connector on the registration clutch side cannot be disconnected. When removing the registration clutch, be sure to disconnect the connector on the DC controller PCB (J113).

8) Disconnect the three connectors [1].



F-3-484

9) Remove the eight screws [1] and the main drive unit [2].

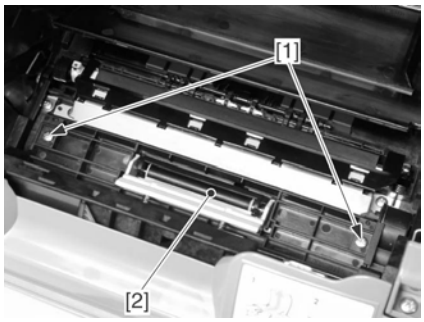


F-3-485

3.5.6.6 Removing the Registration Shutter Unit

0007-9005

1) Open the top cover unit.
2) Remove the two screws [1] and the registration shutter unit [2].

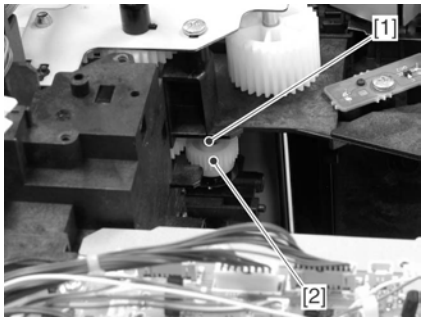


F-3-486

3.5.6.7 Removing the Registration Roller Unit

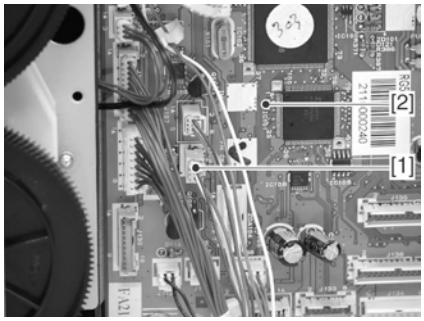
0005-8792

1) Unhook the claw [1] and remove the registration drive gear [2].



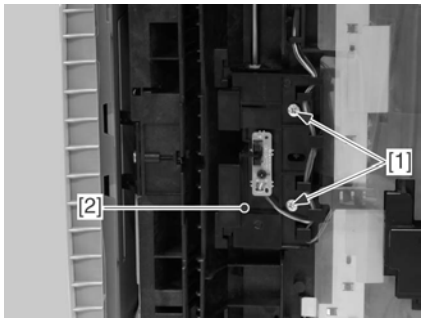
F-3-487

2) Disconnect the connector [1] on the DC controller [2].



F-3-488

3) Remove the two screws [1] and the registration roller unit [2].



F-3-489

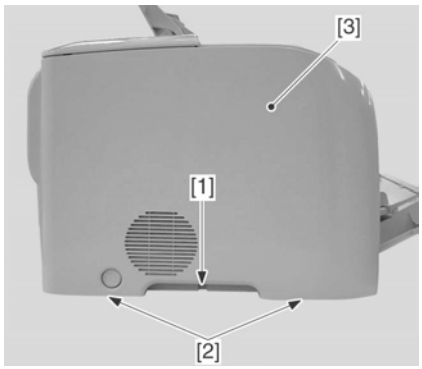
⚠ When replacing the registration roller unit, be careful not to bend the sheet.

3.5.7 Registration Clutch

3.5.7.1 Removing the Upper Cover Unit

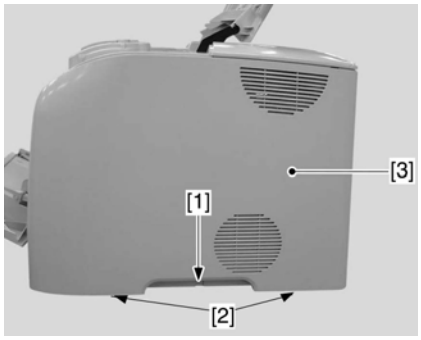
0007-9008

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



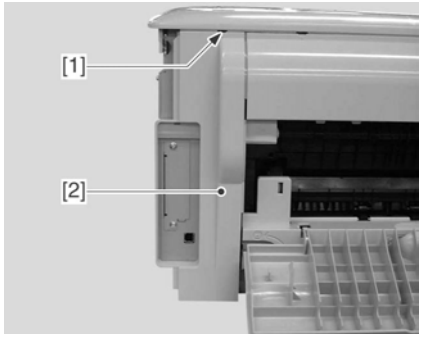
F-3-490

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



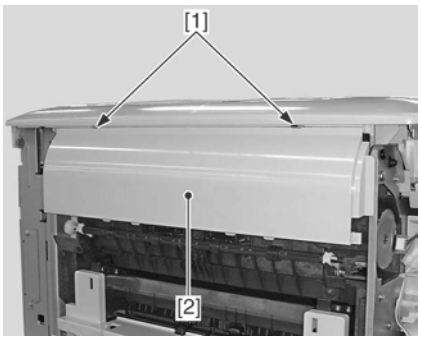
F-3-491

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



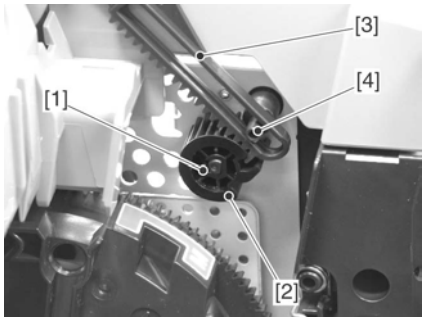
F-3-492

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



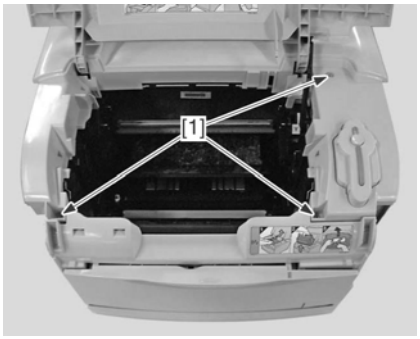
F-3-493

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



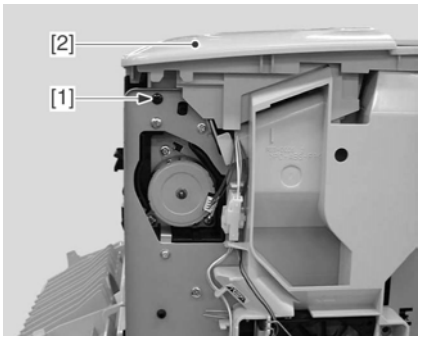
F-3-494

11) Remove the three screws [1].



F-3-495

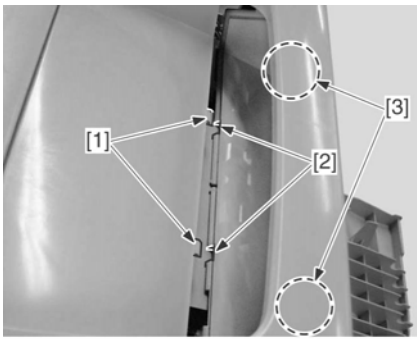
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.

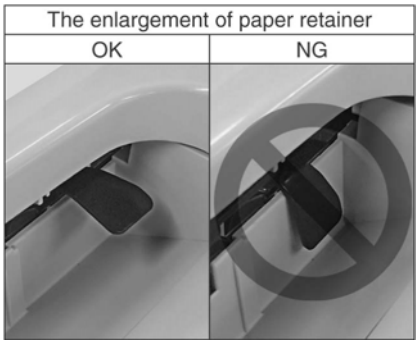


F-3-496

⚠

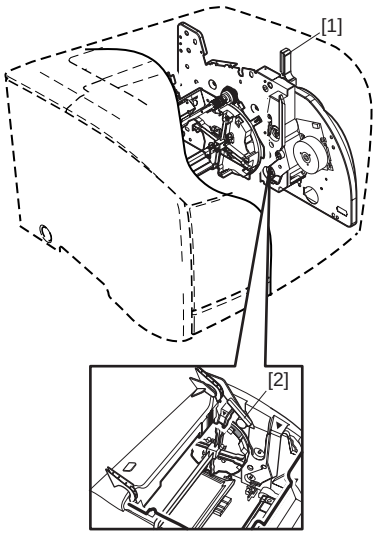
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



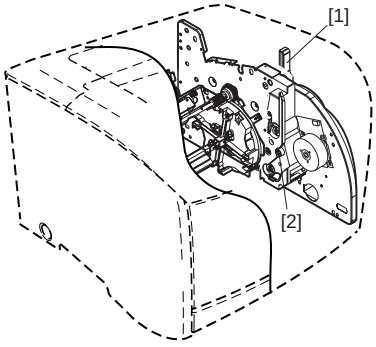


F-3-497

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-498

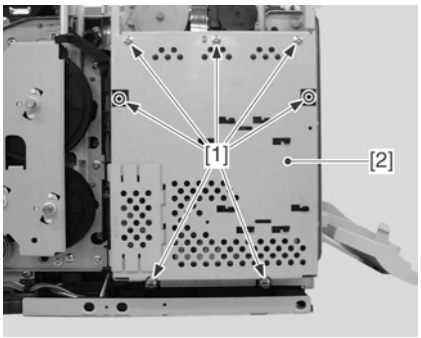


F-3-499

3.5.7.2 Removing the Video Controller PCB

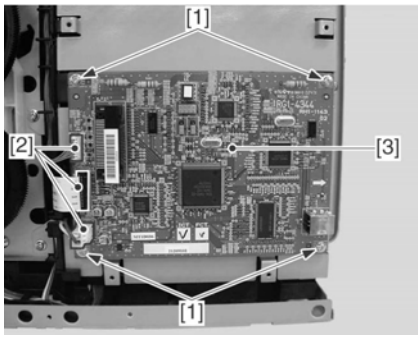
0007-9009

1) Remove the seven screws [1], and detach the shield cover.



F-3-500

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



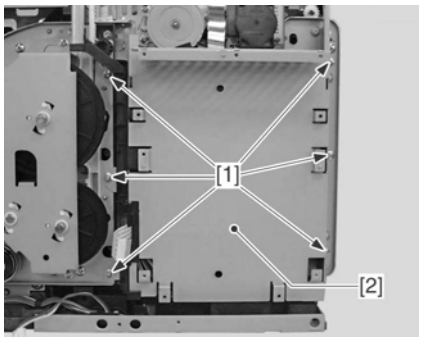
F-3-501

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.5.7.3 Removing the Registration Clutch

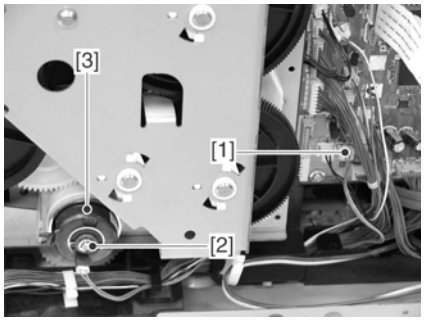
0005-8991

1) Remove the 6 screws [1], and detach the shield mount [2].



F-3-502

2) Disconnect the connector [1] and remove the E-ring [2]. Remove the registration clutch [3].



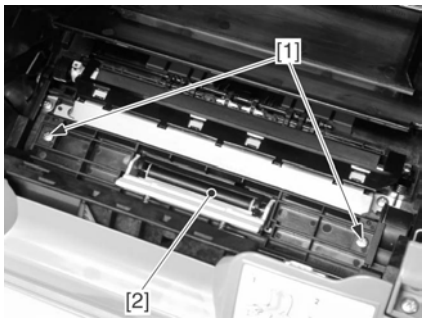
F-3-503

3.5.8 Registration Shutter Unit

3.5.8.1 Removing the Registration Shutter Unit

0005-8782

1) Open the top cover unit.
2) Remove the two screws [1] and the registration shutter unit [2].



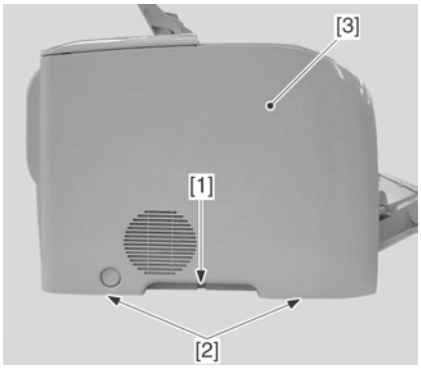
F-3-504

3.5.9 Front Fixing Paper Detection Sensor

3.5.9.1 Removing the Upper Cover Unit

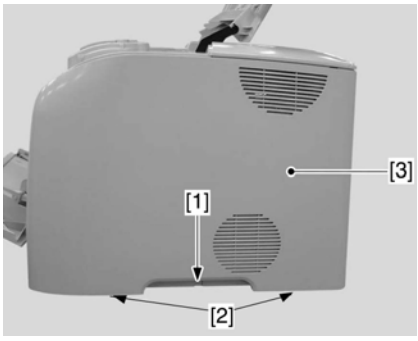
0007-9011

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



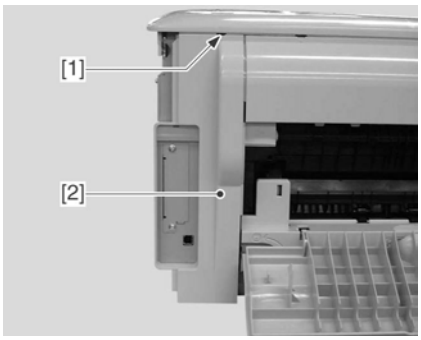
F-3-505

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



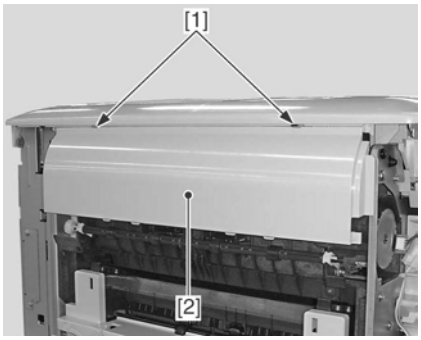
F-3-506

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



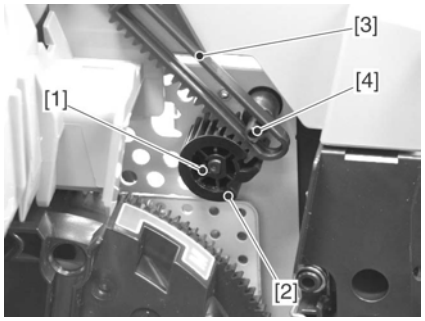
F-3-507

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



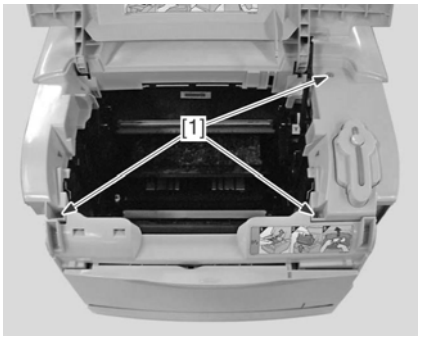
F-3-508

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



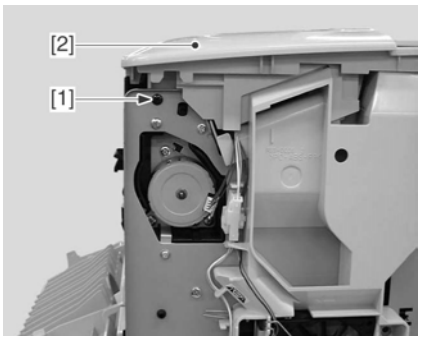
F-3-509

11) Remove the three screws [1].



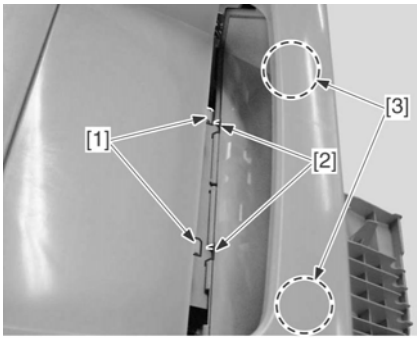
F-3-510

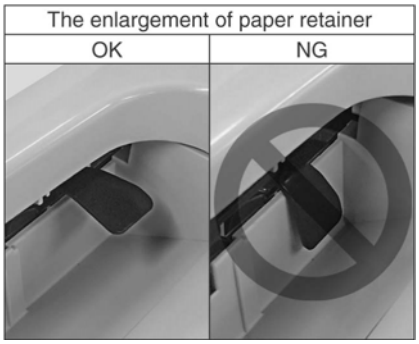
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-511

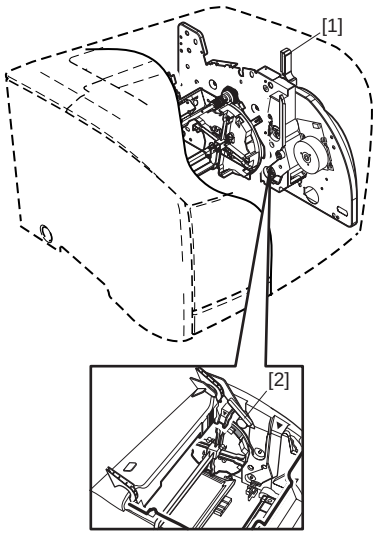
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



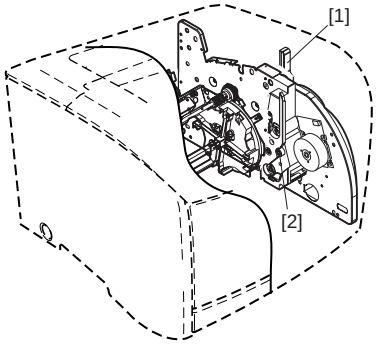


F-3-512

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-513

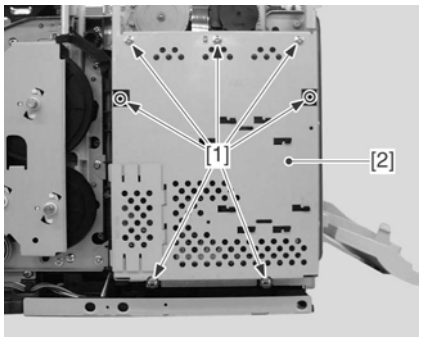


F-3-514

3.5.9.2 Removing the Video Controller PCB

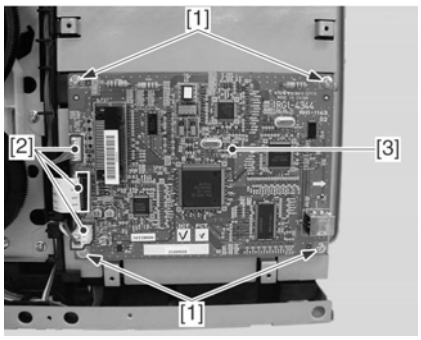
0007-9012

1) Remove the seven screws [1], and detach the shield cover.



F-3-515

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



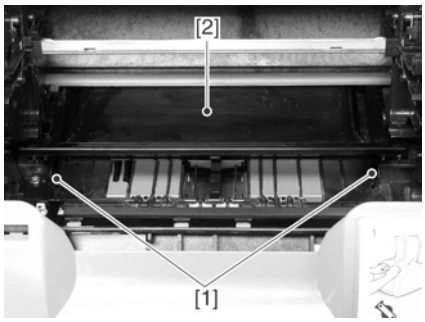
F-3-516

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.5.9.3 Removing the Front fixing paper detection sensor

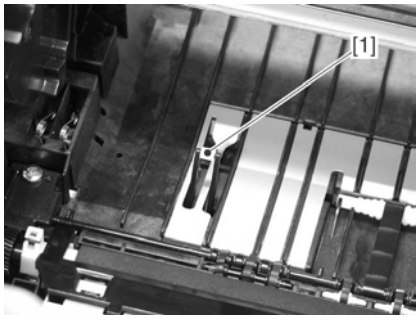
0005-8944

1) Remove the two claws [1] and the toner tray [2].



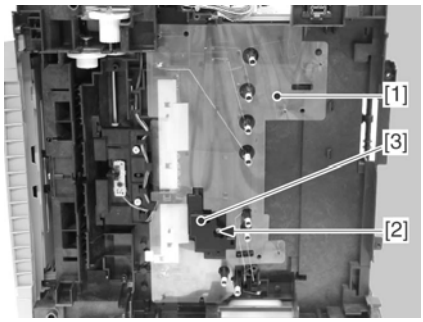
F-3-517

2) Remove the fixing front paper detection sensor roller [1].



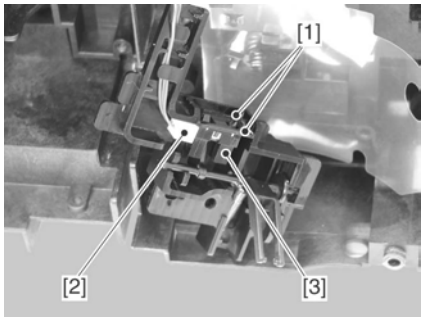
F-3-518

3) Flip the sheet [1]
4) Remove the screw [2] and slide the fixing front sensor unit [3].



F-3-519

5) Unhook the 2 claws [1] and disconnect the connector [2] to remove the fixing front paper detection sensor [3] off the printer.



F-3-520

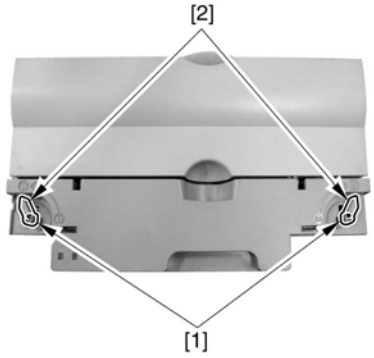
3.6 FIXING SYSTEM

3.6.1 Fixing Film Unit

3.6.1.1 Removing the Face-up Cover

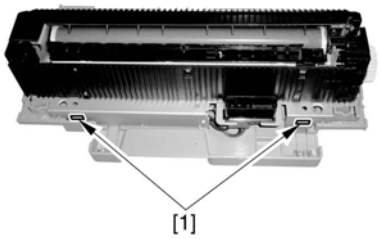
0008-3510

1) Unhook the two claws [1] and remove the two levers [2] from the fixing unit.



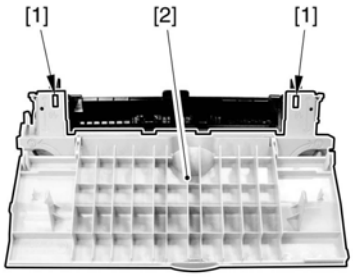
F-3-521

2) Unhook the two claws [1].



F-3-522

3) Unhook the two claws [1] and remove the face-up cover [2] from the fixing unit.

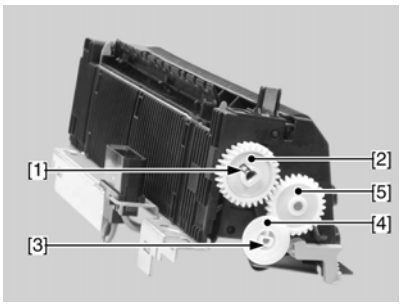


F-3-523

3.6.1.2 Removing the Fixing Film Unit

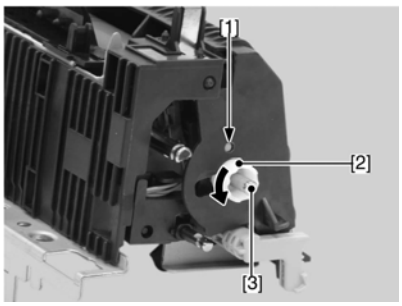
0007-9392

1) Unhook the 1 claw [1] and remove theÅ@delivery roller gear[2].
2) Unhook the 1 claw [3] and remove theÅ@pressure roller gear[4].
3) Remove the idle gear[5].



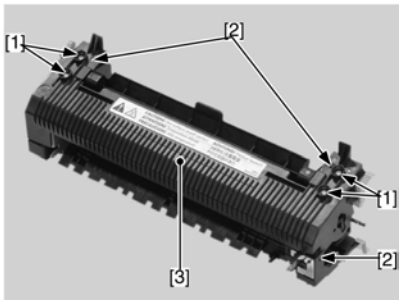
F-3-524

4) Pressing the boss [1] inward, rotate the delivery idle gear shaft holder [2] in the direction of the arrow and remove the holder together with the delivery idle gear shaft [3].



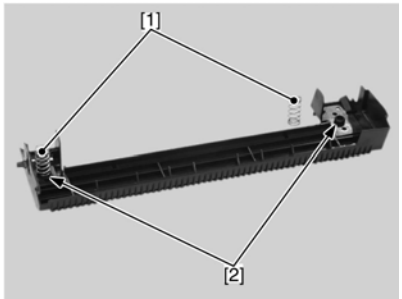
F-3-525

5) Remove the 4 screws[1], unhook the 3 claws [2], and remove the fixing top cover [3].



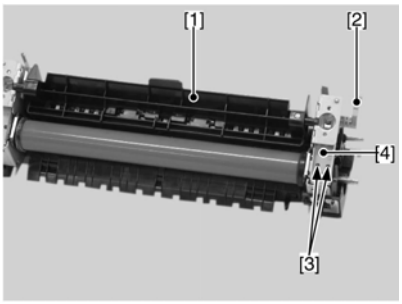
F-3-526

Make sure that the 2 springs are fitted onto the bosses on the fixing top cover when reassembling the cover. See the figure for the correct positions of the boss and springs (shown on the left).



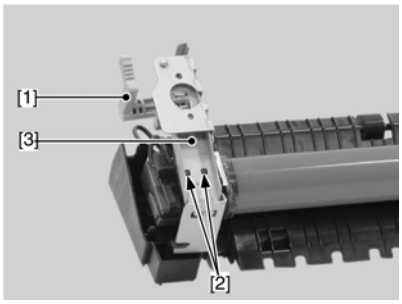
F-3-527

6) Remove the top separation guide [1].
7) Remove the right pressure release lever [2].
8) Slide the right pressure plate [4] upward and release the 2 bosses [3].
9) Remove the right pressure plate [4] from the fixing unit.



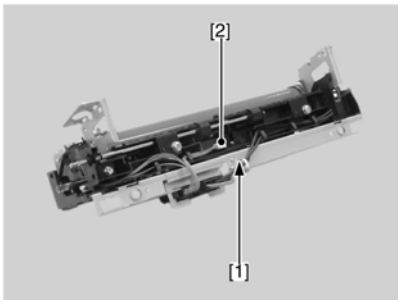
F-3-528

10) Remove the left pressure release lever [1].
11) Slide the left pressure plate [3]upward and release the 2 bosses [2].
12) Remove the left pressure plate [3] from the fixing unit.



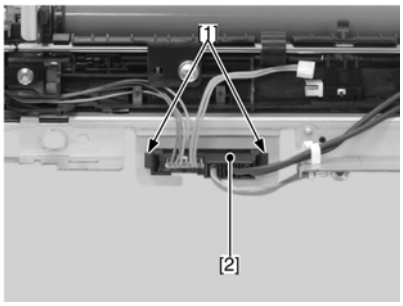
F-3-529

13) Remove the 1 screw [1] and unplug the 1 connector [2].



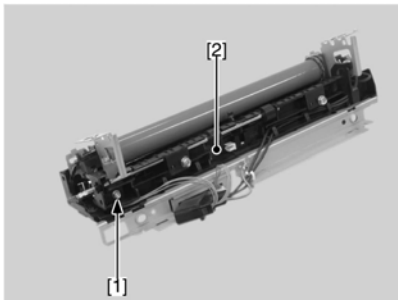
F-3-530

14) Unhook the 2 claws [1] and unplug the 1 connector [2].



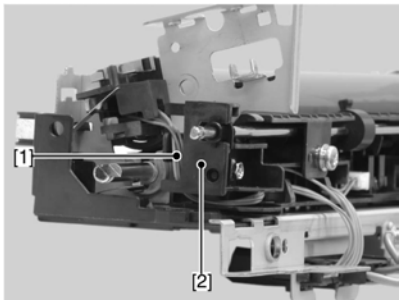
F-3-531

15) Remove the 1 screw [1] and slide the fixing separation guide [2] out to the left.



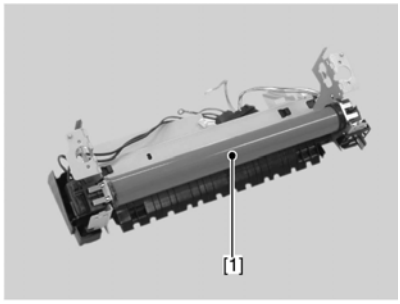
F-3-532

Make sure that all cables on the fixing film unit are hooked into the fixing separation guide when reassembling the guide. Especially the right-side cables are easy to be pinched unless properly hooked into the guide.



F-3-533

16) Lift the fixing film unit [1] up straight in horizontal position to take it out of the fixing unit.



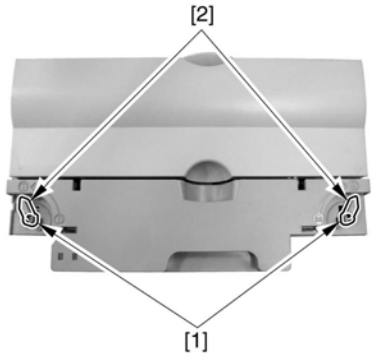
F-3-534

3.6.2 Fixing Pressure Roller

3.6.2.1 Removing the Face-up Cover

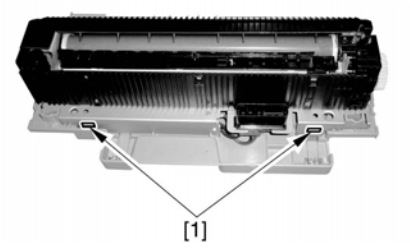
0008-3513

1) Unhook the two claws [1] and remove the two levers [2] from the fixing unit.



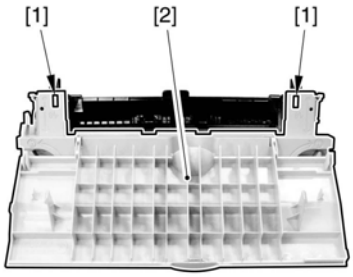
F-3-535

2) Unhook the two claws [1].



F-3-536

3) Unhook the two claws [1] and remove the face-up cover [2] from the fixing unit.

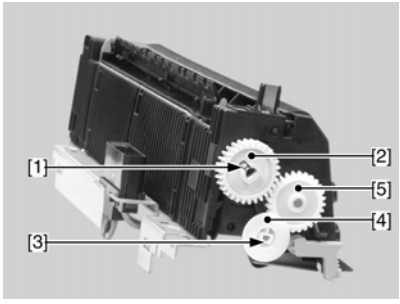


F-3-537

3.6.2.2 Removing the Fixing Film Unit

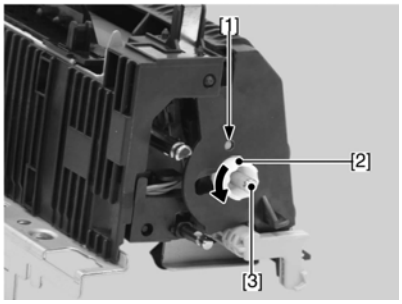
0007-9861

1) Unhook the 1 claw [1] and remove theÅ@delivery roller gear[2].
2) Unhook the 1 claw [3] and remove theÅ@pressure roller gear[4].
3) Remove the idle gear[5].



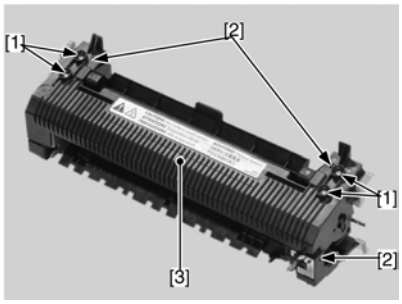
F-3-538

4) Pressing the boss [1] inward, rotate the delivery idle gear shaft holder [2] in the direction of the arrow and remove the holder together with the delivery idle gear shaft [3].



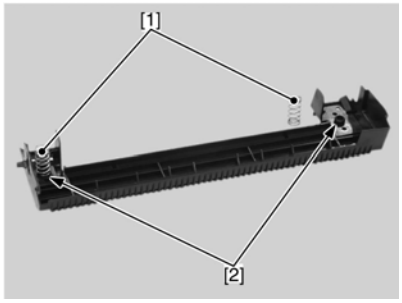
F-3-539

5) Remove the 4 screws[1], unhook the 3 claws [2], and remove the fixing top cover [3].



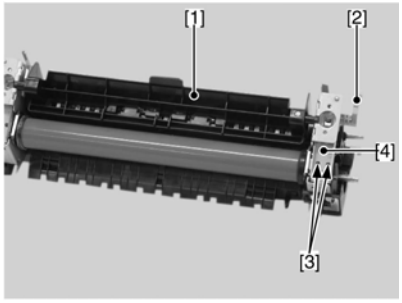
F-3-540

Make sure that the 2 springs are fitted onto the bosses on the fixing top cover when reassembling the cover. See the figure for the correct positions of the boss and springs (shown on the left).



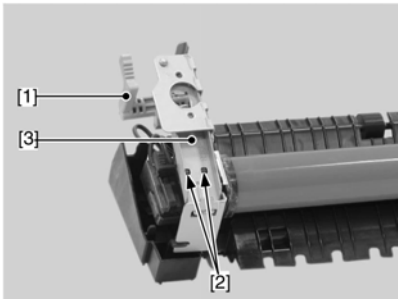
F-3-541

6) Remove the top separation guide [1].
7) Remove the right pressure release lever [2].
8) Slide the right pressure plate [4] upward and release the 2 bosses [3].
9) Remove the right pressure plate [4] from the fixing unit.



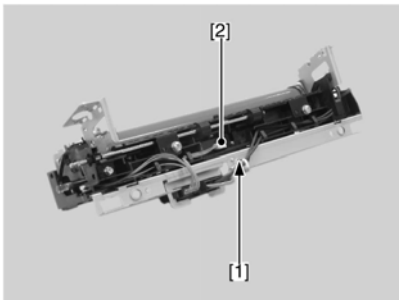
F-3-542

10) Remove the left pressure release lever [1].
11) Slide the left pressure plate [3]upward and release the 2 bosses [2].
12) Remove the left pressure plate [3] from the fixing unit.



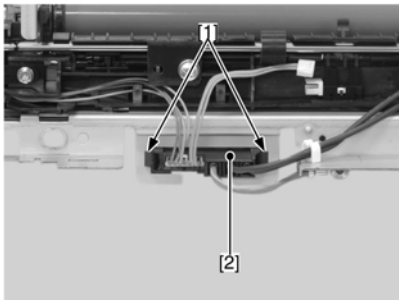
F-3-543

13) Remove the 1 screw [1] and unplug the 1 connector [2].



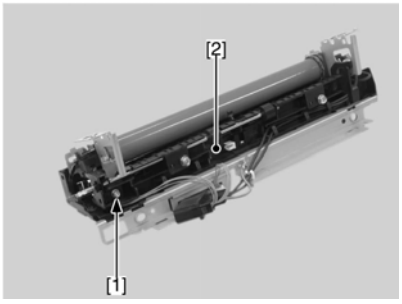
F-3-544

14) Unhook the 2 claws [1] and unplug the 1 connector [2].



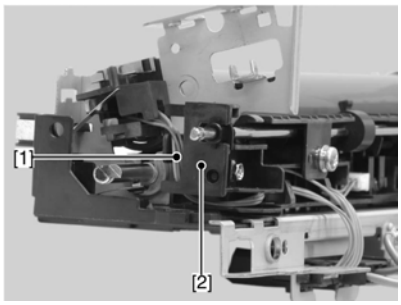
F-3-545

15) Remove the 1 screw [1] and slide the fixing separation guide [2] out to the left.



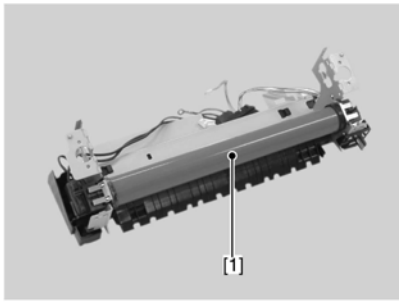
F-3-546

Make sure that all cables on the fixing film unit are hooked into the fixing separation guide when reassembling the guide. Especially the right-side cables are easy to be pinched unless properly hooked into the guide.



F-3-547

16) Lift the fixing film unit [1] up straight in horizontal position to take it out of the fixing unit.

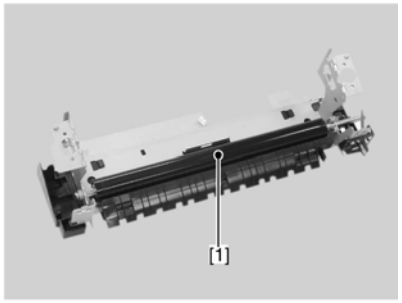


F-3-548

3.6.2.3 Removing the Pressure Roller

0007-9406

1) Remove the pressure roller[1] from the fixing unit.



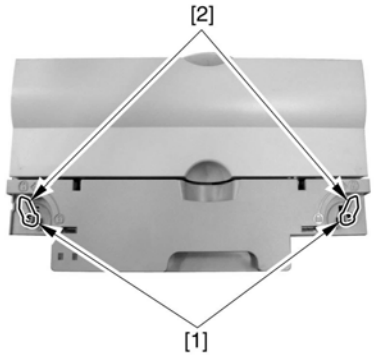
F-3-549

3.6.3 Delivery Sensor

3.6.3.1 Removing the Face-up Cover

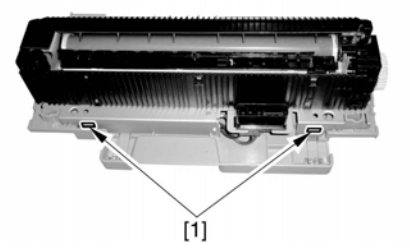
0008-3515

1) Unhook the two claws [1] and remove the two levers [2] from the fixing unit.



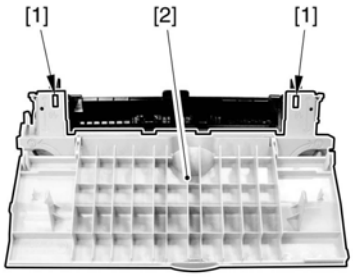
F-3-550

2) Unhook the two claws [1].



F-3-551

3) Unhook the two claws [1] and remove the face-up cover [2] from the fixing unit.

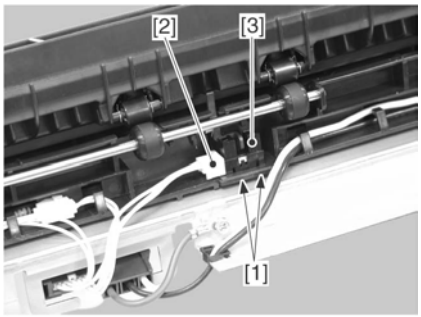


F-3-552

3.6.3.2 Removing the Fixing Delivery Paper Sensor

0005-8939

1) Unhook the two claws [1] and disconnect the connector [2]. Remove the fixing delivery paper sensor [3].



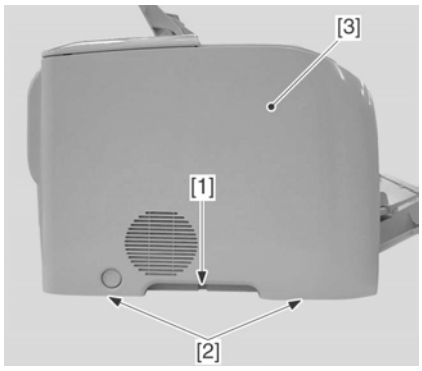
F-3-553

3.6.4 Fixing Motor

3.6.4.1 Removing the Upper Cover Unit

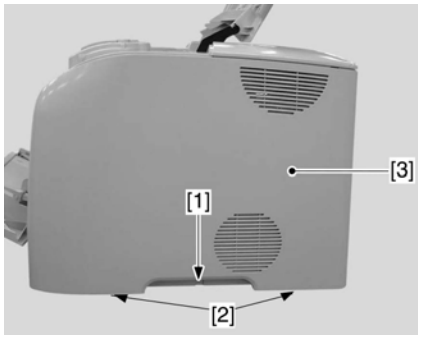
0007-9023

1) Open the upper cover unit.
2) Remove the screw [1] and unhook the two claws [2].
3) Pull the bottom of the left cover [3] toward you and slide it in the direction of under to remove it.



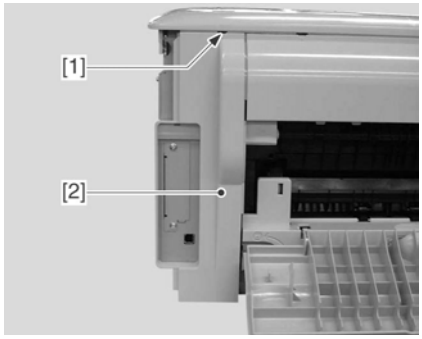
F-3-554

4) Remove the screw [1] and unhook the two claws [2].
5) Pull the bottom of the right cover [3] toward you and slide it in the direction of the arrow to remove it.



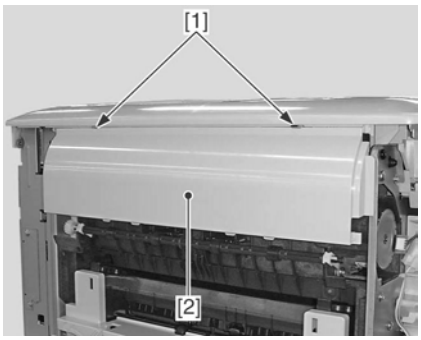
F-3-555

6) Open the face-up cover.
7) Unhook the claw [1] and remove the I/O cover [2] from the printer.



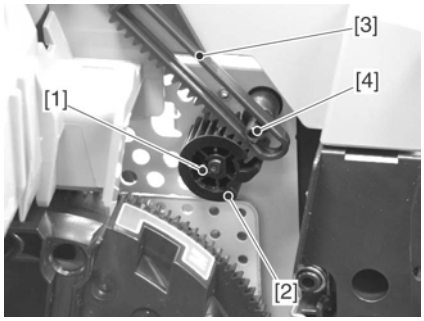
F-3-556

8) Unhook the two claws [1]. Slide the rear cover [2] downward and remove it.



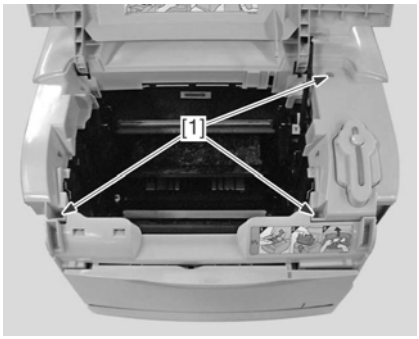
F-3-557

9) Unhook the claw [1] and remove the link gear [2].
10) Remove the link lever [3] from the shaft [4].



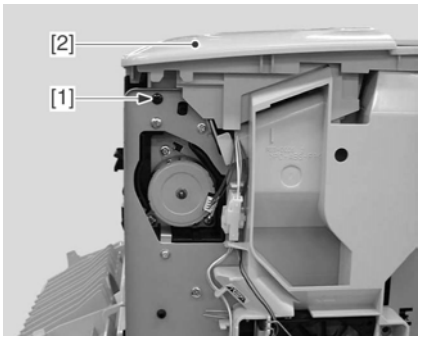
F-3-558

11) Remove the three screws [1].



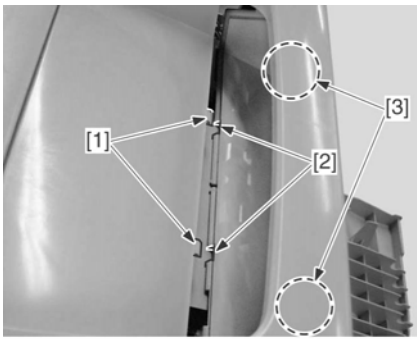
F-3-559

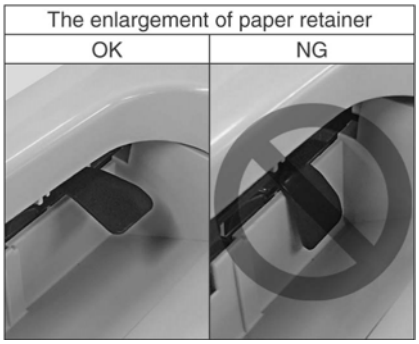
12) Remove the screw [1] (black), and detach the upper cover [2] from the machine.



F-3-560

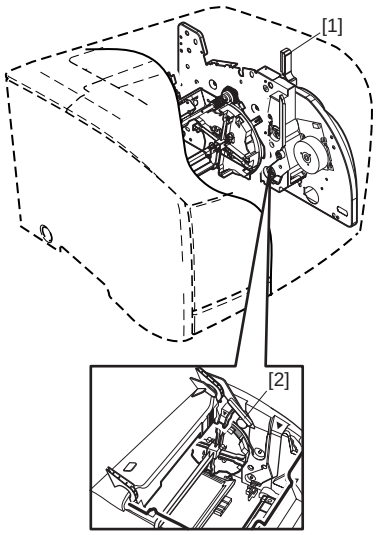
1. When attaching the upper cover, be sure that you tighten the screw (black) you removed in step 5) at its correct location.
2. When attaching the upper cover, be sure that you match the 2 positioning lugs [1] of the upper cover with the 2 notches in the face-up auxiliary cover. At this time, check to make sure that the paper retainer [3] does not block the paper path.



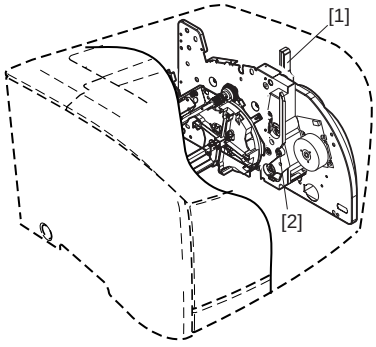


F-3-561

1. Be sure to install the top cover unit with the drive release lever [1] pulled up (drive release status) and then install the link lever [2].
2. When installing the drum cartridge in the printer with the top cover unit removed, be sure to do so after pulling up the drive release lever [1] securely (drive release status). When the lever is pulled down (drive status), the coupling [2] is pushed out. Therefore, the shaft of the drum cartridge may hit the coupling and may damage the coupling.



F-3-562

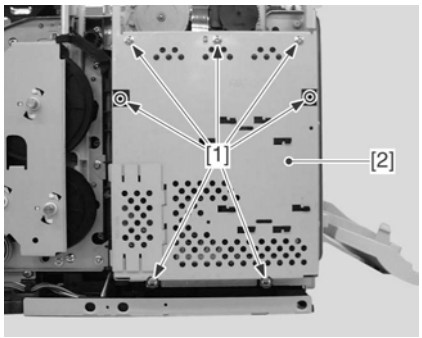


F-3-563

3.6.4.2 Removing the Interface Controller PCB

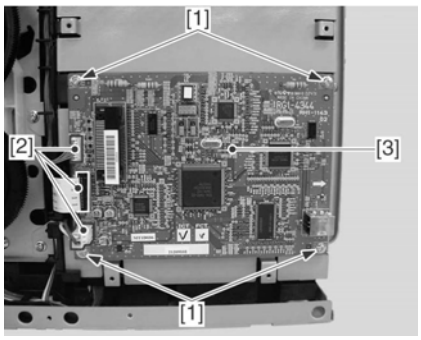
0007-9024

1) Remove the seven screws [1], and detach the shield cover.



F-3-564

2) Remove the four screws [1], and disconnect the three connectors [2]; then, detach the interface connector PCB [3] from the machine.



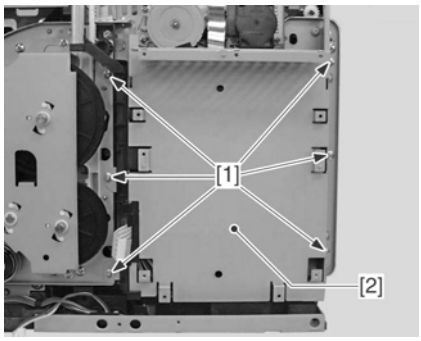
F-3-565

If you have replaced the video controller PCB, be sure to go through the following:
1. Execute PWM adjustment in service mode.
2. Remove the existing EEPROM (IC6), and mount it to the new PCB.

3.6.4.3 Removing theÅ@Fixing Motor

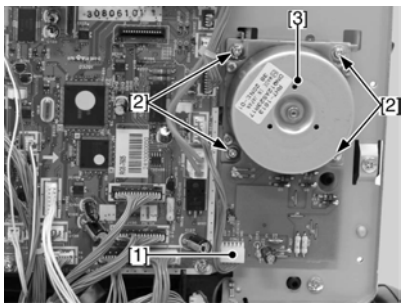
0007-9419

1) Remove the 6 screws [1], and detach the shield mount [2].



F-3-566

2) Unplug the 1 connector [1] and remove the 4 screws [2].
3) Remove the fixing motor [3] from printer.



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4.1 Periodically Replaced Parts

4.1.1 Periodic Replacement Parts

0005-8786

- No parts require periodic replacement in this printer.

4.2 Consumables

4.2.1 Expected Service Life of Consumable Parts

0005-8788

- Some parts of the machine are likely to require replacement once or more because of wear or damage. Replace them when they are found to be faulty by referring to the following table:

T-4-1

No.	Parts name	Parts No.	Q'ty	Estimated life	Remarks
1	Fixing assembly(100V)	RG5-7413-000	1	50,000 prints	LBP-2410
2	Fixing assembly(120V)	RG5-7423-000	1	50,000 prints	
3	Fixing assembly(220V)	RG5-7424-000	1	50,000 prints	
4	Fixing assembly(100V)	RG5-7440-000	1	50,000 prints	LBP5200
5	Fixing assembly(120V)	RG5-7441-000	1	50,000 prints	
6	Fixing assembly(220V)	RG5-7442-000	1	50,000 prints	

4.3 Periodical Service

4.3.1 Periodic Service

0005-8793

The printer has no parts that require periodic servicing.

4.4 Cleaning

4.4.1 Pick-up roller

0005-8795

Clean it with lint free paper.

4.4.2 Separation Pad

0005-8796

Clean it with lint free paper.

4.4.3 Registration roller

0005-8797

Clean it with lint free paper. If the dirt cannot be removed, use alcohol with lint free paper. Be careful not to remove the spring otherwise it may cause a skew or jam. If it is out of place, reset it properly.

4.4.4 Registration shutter

0005-8801

Clean it with lint free paper.

4.4.5 Secondary transfer roller

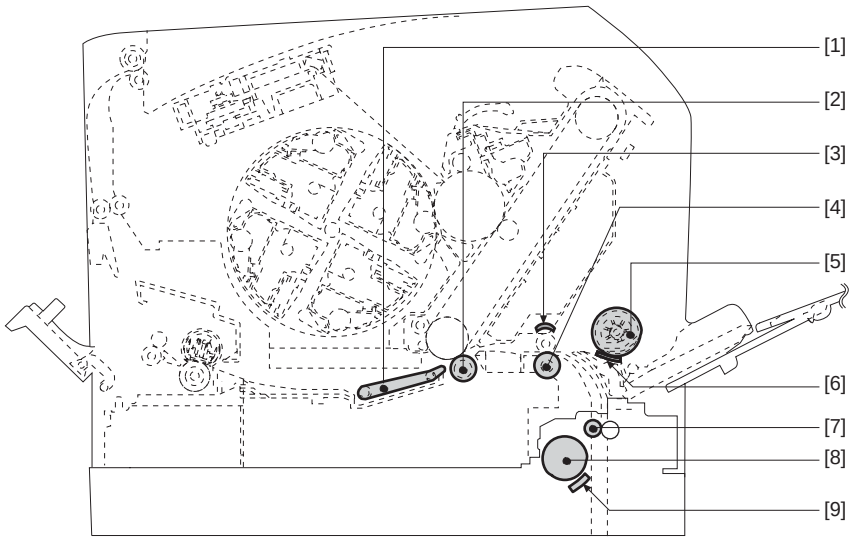
0005-8802

Clean it with lint free paper only when it has severe dirt.
When cleaning the roller, do not touch or contaminate with solvent or oil.

4.4.6 Feed belt

0005-8805

Clean it with lint free paper.



F-4-1

T-4-2

[1]	Feed belt	[6]	Separation pad
[2]	Secondary transfer roller	[7]	feed roller (250 sheet paper feeder)
[3]	Registration shutter	[8]	Pick-up roller (250 sheet paper feeder)
[4]	Registration roller	[9]	Separation pad (250 sheet paper feeder)
[5]	Multi-purpose tray pick-up roller		

4.4.7 External Covers

0005-8823

When cleaning the external covers, use a firmly squeezed wet cloth.

4.5 User Maintenance

4.5.1 Toner cartridge

0005-8682

Replace it as necessary.

4.5.2 Drum Cartridge

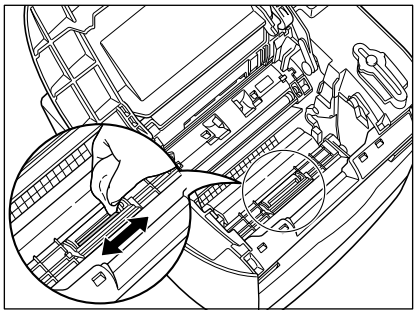
0005-8684

Replace it as necessary.

4.5.3 Mylar sheet

0005-8685

If necessary, clean the mylar sheet with a firmly squeezed wet soft cloth.

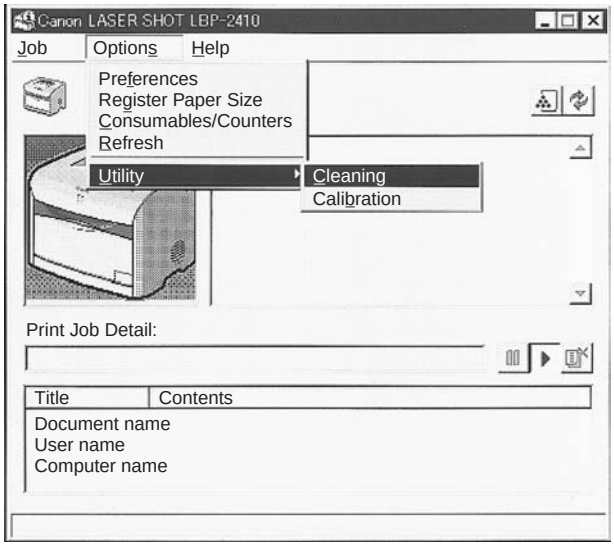


F-4-2

4.5.4 Pressure Roller (fixing assembly)

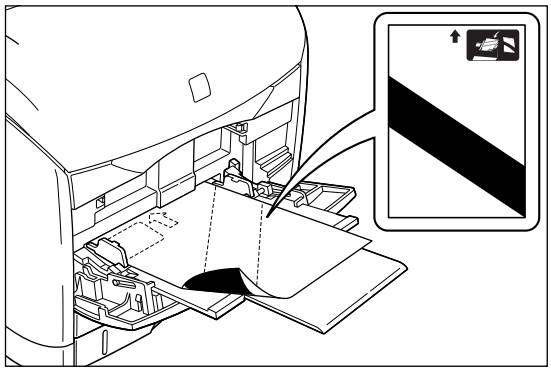
0005-8687

If you have replaced the cartridge or the fixing assembly, clean the pressure roller as follows:
1) Open the multifeeder tray.
2) Open the face-up delivery tray.
3) Place a single sheet of A4 or LTR print paper in the multifeeder tray.
4) On a PC to which the machine's software has been installed, bring up the [Printer] dialog box.
5) Select [Canon LASER SHOT LBP-2410]or [Canon LBP5200], and select [Properties] if for Windows 98/Me or [Print Setup] if for Windows 2000/XP.
6) From [Setup Page], select [Display Print Status Window].
7) From [Option], select [Utilities] and then [Cleaning].



F-4-3

8) See that a cleaning page is generated in a while.
9) Place the cleaning page in the multifeeder tray with its printed side facing down and the arrow toward the rear.



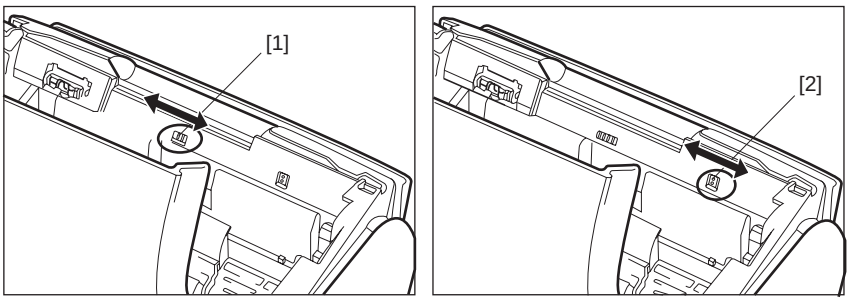
F-4-4

- Take care. Once the machine starts cleaning, you will not be able to stop it in the middle.
- It take about 3 min to clean the fixing assembly (i.e., from when you have placed the cleaning paper in the manual feed tray to when the paper is delivered). Do not turn off the power or open the cover during this period of time.

4.5.5 Density sensor/ITB home position sensor

0005-8689

When replacing the drum cartridge or contamination is found in the printer, clean the detection windows of the density detection sensor, as well as of the ITB home position detection sensor.



F-4-5

T-4-3

[1]	Density sensor
[2]	ITB home position sensor

⚠ The printer may indicate an image defect when density detection sensor or the ITB home position detection sensor is not clean. In these cases, clean the detection windows according to the procedures shown above.

Chapter 5 TROUBLESHOOTING

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5.1 MEASUREMENT AND ADJUSTMENT

5.1.1 Initial Check

5.1.1.1 Initial Check

0005-8707

Check the following items before you diagnose malfunction. If any failure is found, a service engineer is to clear the problem and to give the instruction to a user.

1) Installation environment

a. The power voltage is -/+10 % of the rated voltage.
b. The printer is securely installed on a level surface.
c. The room temperature is kept between 10 and 30 deg C, and the relative humidity, between 10 and 80 %.
d. Avoid sites generating ammonia gas, high temperature or high humidity (near water faucet, kettle, or humidifier), cold places, open flames, dusty area and sites the wind blows in from the air-conditioning duct.
e. Avoid sites exposed to direct sunlight. If unavoidable, advise the customer to hang curtains.
f. A well-ventilated place.
g. Make sure that the power cord is inserted to the printer and the outlet securely.

2) Paper checks

a. The recommended paper for the printer is used.
b. Paper is not damp.
c. Paper is not dirty.

3) Paper sets

a. The amount of paper in the pick-up source is within specifications.
b. Paper is correctly set on the selected pick-up source.
c. The size guides are aligned with paper.

4) Cartridge sets

a. Make sure the EP-87 toner cartridges in each color are set in the printer properly.
b. Make sure the EP-87 drum cartridge is set in the printer properly.

5) Fixing unit sets

a. Make sure the fixing unit is set in the printer properly.

6) External cover sets

a. Make sure the top cover and memory cover are closed securely.

7) Condensation

During winter, if the printer is brought from a cold place such as a warehouse into a warm room, condensation will appear inside the printer, causing various problems.
Ex.)
a. Condensation in the optical system (four-sided mirror, reflective mirror, lens, etc.) will result in a light print image.
b. As the photosensitive drum is cold, the resistance of the photoconductive layer is high; this will lead to incorrect contrast.

If condensation appears, either wipe the parts with dry cloth, or leave the printer on for 10 to 20 minutes.

If the toner cartridges are opened soon after being moved from a cold room to a warm room, condensation may appear inside the cartridge and may cause various problems.

Be sure to instruct the user that it is necessary to leave the printer for one to two hours at a room temperature to allow it to acclimatize to the temperature.

5.1.2 Test Print

5.1.2.1 Test Print

0005-8741

The machine is capable of generating engine test prints. If the machine has suffered a fault, generate a test pint to help identify the location of the fault.
When the engine test print is made, a test print pattern (horizontal lines) in four colors, magenta, cyan, yellow, and black, is printed as shown in the figure below.
A test pattern can be made by pressing the test print switch located on the front side of the printer once when the printer enters standby status.
The multi-purpose tray is the only possible pick-up source for test print.
The optional paper feeders cannot be used.

F-5-1

5.1.3 Adjustment of Electrical Components

5.1.3.1 When Replacing the Laser/Scanner Assembly and interface controller PCB

0005-8780

The EEPROM (NVRAM) of the video controller retains the PWM adjustment values appropriate to individual laser/scanner, requiring you to update the PWM adjustment values if you have replaced the these unit at this time, be sure to execute PWM adjustment in user mode to update the PWM adjustment settings stored in the EEPROM on the interface controller PCB.(For detailed instructions, see "Service Mode.")

5.1.4 Adjustment of Fixing System

5.1.4.1 Checking the nip width of the lower fixing roller

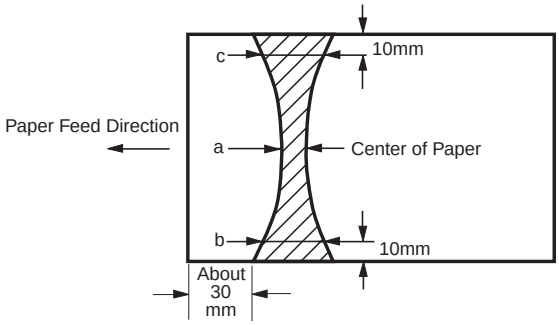
0005-8777

The fixing unit is not designed to allow the adjustment of the pressure (nip width); however, incorrect nip width can cause fixing defects.
Check the nip width by following the procedures below. If the nip width does not satisfy specifications, replace the fixing unit.

1) Make an all-black print of A4 size using the cartridge of this printer by operating external devices, and take the print to the customer's site.
2) Place the all-black print facing down on the multi-purpose tray.
3) Select face-up delivery.
4) Press the test print switch.
5) Open the delivery door immediately after the leading edge of the print has come out to the face-up tray. Take out the print from the printer after 10 seconds from turning off the power switch.
6) Measure the width of the glossy band across the paper and check that it meets the following requirements shown in figure.

* **LBP-2410**
- Center (a): 6 to 7.5 mm
- Difference between right/left and center (b - a, c - a): 0.6 mm or less
- Difference between right and left (|b - a|): 0.5 mm or less

* **LBP5200**
- Center (a): 5.1 to 6.1 mm
- Difference between right/left and center (b - a, c - a): 0.3 to 0.8mm
- Difference between right and left (|b - a|): 0.8 mm or less


c
10mm
Paper Feed Direction
a
Center of Paper
b
10mm
About
30
mm

F-5-2

5.2 SERVICE TOOLS

5.2.1 Standard Tools

0005-8442

The table below lists the standard tools required for servicing the printer.

T-5-1

No.	Tool name	Tool No.	Remark
1	Tool case	TKN-0001	With a clip
2	Jumper wire	TKN-0069	0.02 to 0.3 mm
3	Clearance gauge	CK-0057	0 to 600 g for checking the cassette spring pressure
4	Compression spring scale	CK-0058	
5	Phillips screwdriver	CK-0101	M4, M5 Length : 363 mm
6	Phillips screwdriver	CK-0104	M3, M4 Length: 155 mm
7	Phillips screwdriver	CK-0105	M4, M5 Length: 191 mm
8	Phillips screwdriver	CK-0106	M4, M5 Length: 85 mm
9	Flat-blade screwdriver	CK-0111	
10	Precision flat-blade screwdriver set	CK-0114	6-piece set
11	Allen wrench set	CK-0151	5-piece set
12	File, fine	CK-0161	
13	Allen (hex) screwdriver	CK-0170	M4 Length: 107 mm
14	Diagonal cutting pliers	CK-0201	
15	Needle-nose pliers	CK-0202	
16	Pliers	CK-0203	Applied to the axis ring
17	Retaining ring pliers	CK-0205	
18	Crimper	CK-0218	
19	Tweezers	CK-0302	Employed to measure 150 mm
20	Ruler	CK-0303	
21	Soldering iron	CK-0309	100V, 30 W
22	Mallet, plastic head	CK-0314	
23	Brush	CK-0315	
24	Penlight	CK-0327	
25	Plastic bottle	CK-0327	100cc
26	Solder	CK-0329	1.5 (mm dia) × 1 (mm)
27	Desoldering wick	CK-0330	1.5 mm
28	Lint-free paper	CK-0336	500SH/PKG
29	Oiler	CK-0349	30cc
30	Plastic jar	CK-0351	30cc
31	Digital multi-measure	FY9-2032	

5.2.2 Special Tools

0005-8817

No special tools are required for this printer besides the standard tools.

5.2.3 Solvent/Oil List

0005-8820

T-5-2

No.	Name	Use	Remarks
1	Alcohol	Cleaning: plastic(note), rubber, metal, oil, and toner stains	- Flammable: keep away from flame - Purchase locally
2	Lubricating oil	Apply between gear and shaft	- Tool No. CK-8003 (100 ml bottle)
3	Lubricant	Apply to gears (developing rotary unit)	- Tool No. FY9-6015 (20g tube)
4	Lubricant	Apply to gears	- Tool No. HY9-0007 (20g tube)

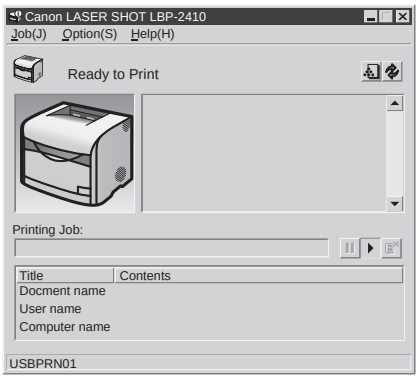
⚠
When cleaning the external covers,use a firmly squeezed wet cloth.

5.3 ERROR CODE

5.3.1 Outline

0005-8932

The printer is not equipped with a status display (LCD), and it uses a PC's display to indicate its status, error codes, and messages as needed. The screen that appears on the PC's display is referred to as the status window. (See the diagram below.)
The status widow is a screen used to communicate to the user the state of the printer by means of messages and animations. A message is indicated in the message areas (one main and the other, sub). A user message is one used to prompt the user for action, while a service message is used to prompt the service person for action.



F-5-3

The page that follows describes service messages. For user messages, see the User's Guide that comes with the printer.

5.3.2 Service Messages

0005-8934

A service message is a message indicated in response to a fault occurring in the printer unit, and is also know as an error code.
An error code appears in the message area of the Status window, and consists of a main code and a detail code (Exxx; in which xxx being 3 numerical characters).

T-5-3

Code	Main cause/description	Remedial action
E000	fixing assembly faulty start-up (open circuit in the main thermistor)	Check the connector of the fixing film unit. Replace the fixing film unit. Replace the DC controller PCB.
	fixing assembly faulty start-up (open circuit in the sub thermistor)	
	fixing assembly faulty start-up (open circuit in the fixing heater)	
E001	fixing heater overheating (short-circuit in the main thermistor)	Check the connector of the fixing film unit. Replace the fixing film unit. Replace the DC controller PCB.
	fixing heater overheating (short-circuit in the sub thermistor)	
E002	fixing assembly low temperature (open circuit in the main thermistor)	Check the connector of the fixing film unit. Replace the fixing film unit. eplace the DC controller PCB.
	fixing assembly low temperature (open circuit in the sub thermistor)	
	fixing assembly low temperature (open circuit in the fixing heater)	
E010	main motor fault	Check the connector of the main motor. Replace the main motor. replace the DC controller PCB.
E021	developing rotary motor fault	Check the connector of the developing rotary motor. Replace the developing rotary motor. Replace the DC controller PCB.
E022	developing rotary drive mechanism fault	Check the connector of the developing rotary drive sensor. Check the connector of the drive motor. Replace the developing rotary drive sensor. Replace the drive motor. Replace the DC controller PCB.
E071	ITB home position sensor fault	Check the connector of the ITB home position sensor. Replace the ITB home position sensor. Replace the DC controller PCB.
E078	secondary transfer roller drive mechanism fault	Check the connector of the roller drive sensor. Check the connector of the roller drive clutch. Replace the main drive assembly (roller Drive sensor). Replace the drum cartridge (roller drive cam). Replace the DC controller PCB.

E100	scanner fault	Check the connector of the laser scanner assembly. Replace the laser scanner assembly. Replace the DC controller PCB.
E196	DC controller memory fault	Replace the DC controller PCB.
E197	engine communication error	Replace the DC controller PCB.
E747	video controller memory fault	Replace the video controller PCB.
E805	fan fault	Check the connector of the cooling fan. Replace the cooling fan. Replace the DC controller PCB.

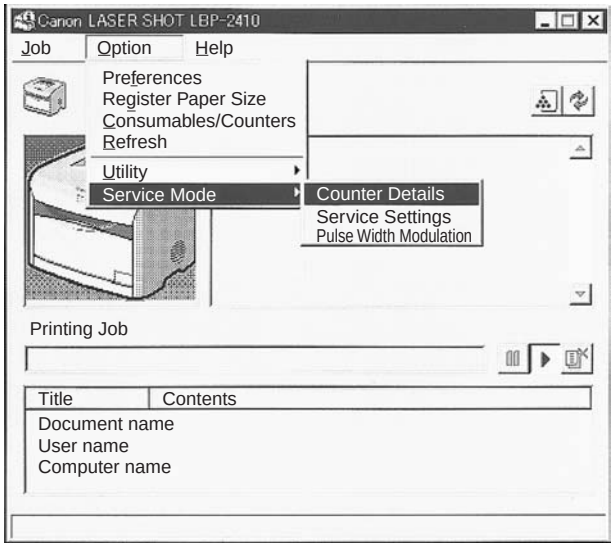
5.4 Sevice Mode

5.4.1 Outline

5.4.1.1 Outline

0005-8824

Service mode is offered exclusively for servicing the machine as when checking its condition. Enter the appropriate ID from the keyboard of a PC to bring up a menu on the printer status window screen.



F-5-4

1) Durables Information
You can check the counter readings of individual cartriges (Y, M, C, K toner and drum cartridges) which are offered as consumables of the machine.
The counter readings of the M toner cartridge and the drum cartridge, however, do not necessarily indicate the number of prints actually made. Be sure to make use of the readings of these 2 counters only as a guide to how long these parts have been in use.
2) Service-Specific Settings
You can set the various bias levels.
These settings are used in the event of a fault in the field. Do not change the various bias values unless doing so is be absolutely necessary.
3) PWM Adjustment
You can execute PWM adjustment for correction of variations that may exist among laser/scanner assemblies.
This adjustment will automatically start up when 'PWM adjustment' is selected from a pull-down menu after the machine has entered service mode; it ends in about 5 sec.

5.4.1.2 Starting Service Mode

0005-8833

To start service mode, bring up the dialog box [Printer] of the PC to which the printer's software has been installed; then, enter the appropriate ID. Specifically, go through the following steps:
1) Select [Canon LASER SHOT LBP-2410] or [Canon LBP5200] ; then, select [Properties] if for Windows 98/Me or [Print Setup] if for Windows 2000/ XP.
2) From [Page Setup], select [Display Printer Status Window].
3) From the keyboard of the PC, press the following keys in sequence: *, 2, 8, and *.
4) From [Options], select [Service Mode].
5) Select the appropriate menu from among the various menus.
When the machine has started service mode, you must turn off the printer to end it. To return to normal mode, you will have to turn it off and then on.

Chapter 6 APPENDIX

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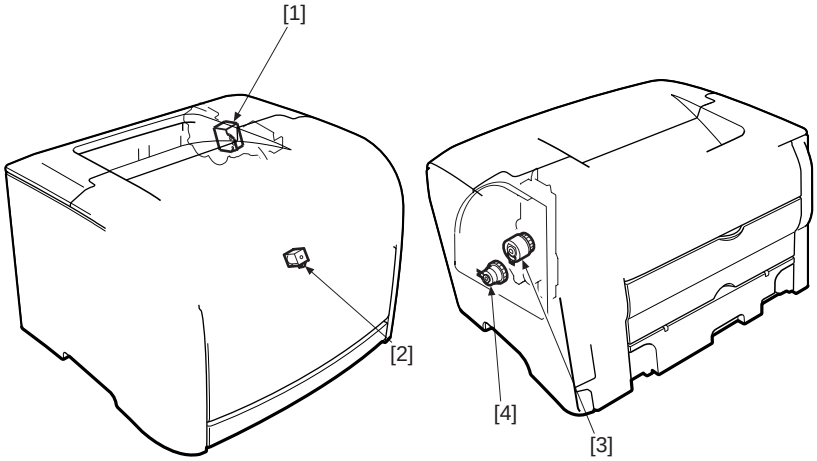
6.1 OUTLINE OF ELECTRICAL COMPONENTS

6.1.1 Clutch/Solenoid

6.1.1.1 Solenoids/Clutches

0005-8950



F-6-1

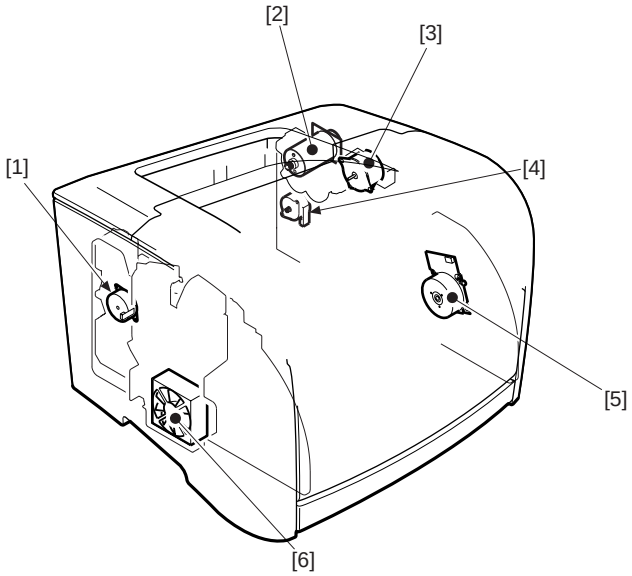
T-6-1

[1]	Developing rotary stopper solenoid	[3]	Roller engaging clutch
[2]	Multi-purpose tray pick-up solenoid	[4]	Registration clutch

6.1.2 Motor/Fan

6.1.2.1 Motors/Fan

0005-8992



F-6-2

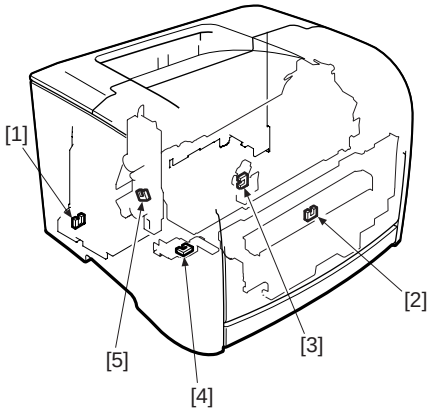
T-6-2

[1]	Engaging motor	[4]	Fixing motor
[2]	Developing rotary motor	[5]	Main motor
[3]	Toner cartridge motor	[6]	Cooling fan

6.1.3 Sensor

6.1.3.1 Sensor

0005-8901



F-6-3

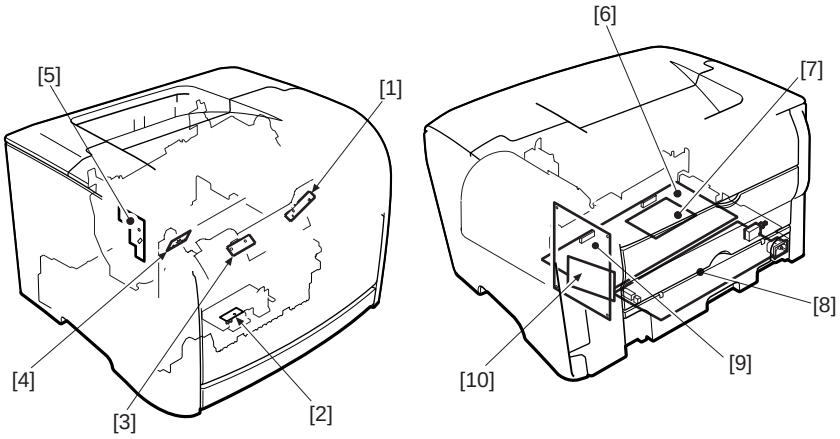
T-6-3

[1]	Multi-purpose tray paper sensor
[2]	Fixing delivery paper sensor
[3]	Developing rotary engaging sensor
[4]	Front fixing paper detection sensor
[5]	Roller engaging sensor

6.1.4 PCBs

6.1.4.1 PCBs

0005-9000



F-6-4

T-6-4

[1]	Waste toner detection PCB	[6]	High-voltage power supply PCB
[2]	Registration detection PCB	[7]	Sub high-voltage power supply PCB
[3]	Density detection PCB	[8]	Power supply unit
[4]	ITB home position detection PCB	[9]	DC controller PCB
[5]	Developing rotary/toner level detection PCB	[10]	Video controller PCB

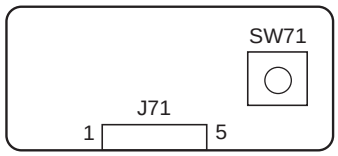
6.1.5 Variable Resistors(VR), Light-Emitting Diodes(LED), and Check Pins by PCB

6.1.5.1 Variable Resistors (VR), Test Pins, Jumpers, and Switches

0005-8783

This section lists only the variable resistors (VR), LEDs, test pins, jumpers, and switches required for after-sales service in the field.
All other VRs, test pins, etc. are for the factory use only. The adjustment and check using these test pins, etc. require special tools, measuring instruments, and high precision. Do not touch them in the field.

1) ITB home position detection PCB



F-6-5

T-6-5

SW No.	Function
SW201	Test print switch

Mar 10 2005

Canon